



TRANSPORTATION PLANNING ANALYSIS

HILLCREST REVELOPMENT MASTER PLAN

ST. PAUL, MINNESOTA

Prepared for:

City of St. Paul

Prepared By:

Kimley-Horn and Associates, Inc.

767 N Eustis Street, Suite 100
St. Paul, MN 55114

MAY 2021

Kimley»Horn

TABLE OF CONTENTS

INTRODUCTION	3
EXISTING ROADWAY CONDITIONS	3
<i>Existing Roadways</i>	3
<i>Existing Pedestrian Infrastructure</i>	4
<i>Existing Bicycle Infrastructure</i>	4
<i>Existing Transit Infrastructure</i>	4
<i>Existing Traffic Volumes</i>	4
<i>Programmed Roadway Improvements</i>	5
<i>Background Growth</i>	5
MASTER PLAN DEVELOPMENT APPROACHS	6
<i>Multimodal Reductions</i>	6
<i>Desired Site Access</i>	7
<i>Approach 1: Hilltop</i>	7
<i>Approach 2: Jobs Focus</i>	8
<i>Approach 3: Wetland Green Edge</i>	9
<i>Master Plan Approachs to Analyze</i>	10
<i>Site Trip Distribution</i>	10
CAPACITY ANALYSIS	12
<i>Existing Year (2020) Conditions</i>	13
<i>Horizon Year No-Build (2040) Conditions</i>	14
<i>Horizon Year Approach 1 Build (2040) Conditions</i>	16
<i>Horizon Year Approach 2 Build (2040) Conditions</i>	19
<i>Multimodal Connections</i>	23
CONCLUSIONS AND RECOMMENDATIONS.....	24
APPENDIX.....	26

APPENDIX

A. Exhibits

B. Turning Movement Counts

C. SimTraffic Analysis Results

INTRODUCTION

The City of St. Paul is planning to redevelop the former Hillcrest Golf Club which was operational from 1921 to 2017. Kimley-Horn is assisting the Cunningham Group in developing the Hillcrest Redevelopment Master Plan for the City of St. Paul. The 112-acre site is currently vacant. Originally, four potential redevelopment concepts were developed for the site, the number of concepts has been narrowed down. This analysis is to identify the impacts of both redevelopment concepts and complete a transportation analysis of each. These plans focus on connecting the neighborhoods, sparking new economic and community development, blending the neighborhood, and the conservation of natural features on the site today.

The redevelopment is anticipated to include the following land uses: multifamily housing, office, light industrial space, and an active park. The former Hillcrest Golf Club is located on the southwest corner of Larparenteur Avenue & McKnight Road. **Exhibit 1** shows the proposed project location. All the exhibits are included in **Appendix A**.

EXISTING ROADWAY CONDITIONS

The proposed redevelopment is located on the Hillcrest Golf Club site in St. Paul, Minnesota. The following study intersections are included in the traffic analysis:

- Larparenteur Avenue & Howard Street
- McKnight Road & Larparenteur Avenue
- McKnight Road & Montana Avenue
- McKnight Road & Nebraska Avenue
- McKnight Road & Arlington Avenue
- Ivy Avenue & Hawthorne Avenue

The study intersections listed above are shown in **Exhibit 1**.

EXISTING ROADWAYS

The major roadways in the study area are Larparenteur Avenue (CSAH 30) and McKnight Road (CSAH 68). The following provides a detailed description of these roadways:

Larparenteur Avenue (CSAH 30) is a two lane east-west roadway. In 2019, Larparenteur Avenue was repaved and now has striped bike lanes between Hazel Street and McKnight Road. Larparenteur Avenue is classified as an A-Minor Augmentor. The MnDOT Traffic Mapping Application reports an annual average daily traffic (AADT) of 8,500 vehicles per day (vpd) within the study area. The posted speed limit on Larparenteur Avenue is 30 miles per hour.

McKnight Road (CSAH 68) was converted from a four-lane to a three-lane cross-section with bikeable shoulders in 2020. Under existing conditions, it was modeled as a four-lane section since the analysis was completed prior to the conversion to a three-lane roadway. McKnight Road is classified as an A-Minor Augmentor. The MnDOT Traffic Mapping Application reports an AADT of 12,600 vpd within the study area. The posted speed limit on McKnight Road is 45 miles per hour.

EXISTING PEDESTRIAN INFRASTRUCTURE

The site is located in a predominately residential area in the northeast corner of St. Paul. There are some existing local businesses and retail at McKnight Road & Larpenteur Avenue, however, the majority of business and retail in the area are located along White Bear Avenue, $\frac{3}{4}$ of a mile west of the site. **Exhibit 1** shows the existing sidewalk and trail facilities near the site. Larpenteur Avenue does not have sidewalk or trail facilities except for a short stretch near Mounds Park Academy. The neighborhood to the west of the site have sidewalks on some of the blocks. Per discussions with the City of St. Paul, ultimately the goal is to provide sidewalks on all city streets. However, there is no immediate plan to provide these improvements. These sidewalks dead-end at the site and do not connect to the trail along McKnight Road. With the conversion of McKnight Road from 4 lanes to 3 lanes, pedestrian refuge islands were installed at Hoyt Avenue, Montana Avenue, Nebraska Avenue, and Arlington Avenue to improve pedestrian crossings.

EXISTING BICYCLE INFRASTRUCTURE

The site is well connected to promote bicycling as a viable mode of transportation to the east and south. However, there are gaps in the existing facilities for trips to/from the north and west of the site. **Exhibit 2** shows the existing bicycle infrastructure accessible from the site, including bike lanes, paved shoulders, and paved trails. Larpenteur Avenue immediately adjacent to the site was recently restriped to provide on street bike lanes, but these lanes end at Hazel Street and leave a gap with no bike facilities near White Bear Avenue. McKnight Road has a trail along the west side of the roadway and also has striped shoulders that can be used by bicycles.

EXISTING TRANSIT INFRASTRUCTURE

Transit service in the project area is provided by Metro Transit and routes are limited in that no bus service is provided directly adjacent to the site along either Larpenteur Avenue or McKnight Road. Details for routes that have stops on the streets adjacent to the proposed site are provided below. **Exhibit 3** shows the project area with all current transit routes and the proposed Rush Line Bus Rapid Transit (BRT) route.

Route 64 is a local bus route from Downtown St. Paul to the Maplewood Mall via Payne Avenue, Maryland Avenue, White Bear Avenue, and continuing through North St. Paul and Maplewood. This route splits prior to approaching the site. Route 64N passes closest to the site. This route operates during the weekdays and the weekend. Service is provided with a 30-minute headway during the rush hours and 15-60-minute headway outside of peak time periods. Metro Transit provided ridership numbers for the route in 2019. For the bus stop closest to the site there were 14 riders per day.

Route 74 is a local bus route from the 46th Street Station in Minneapolis to the Sun Ray Shopping Center in St. Paul via Ford Parkway, West 7th Street, Downtown St. Paul, and continuing through St. Paul to Maplewood. This route operates during the weekdays and the weekend. Weekday service is provided with a 15–20-minute headway during the rush hours and a 20–30-minute headway during the midday and evening hours. The buses run on a 20-30-minute headway on the weekends. Metro Transit provided ridership numbers for the route in 2019. For the three bus stops closest to the site there were 3 riders per day.

EXISTING TRAFFIC VOLUMES

To analyze the traffic operations at the study intersections, weekday peak period turning movement counts were collected at five of the six study intersections on Wednesday January 29, 2020. The turning movement

counts were collected on a typical weekday. Traffic counts at McKnight Road & Larpenteur Avenue were provided by Ramsey County from May 16, 2018.

The network AM peak hour was determined to be 7:15 AM to 8:15 AM and the network PM peak hour was determined to be 4:30 PM to 5:30 PM. Volumes were balanced between the collected count data and the provided count data. **Exhibit 4** shows the AM and PM peak hour traffic volumes at the study intersections. Turning movement counts are shown in **Appendix B**.

PROGRAMMED ROADWAY IMPROVEMENTS

As previously mentioned, McKnight Road was resurfaced and restriped and converted from a four-lane undivided roadway to a three-lane roadway as a component of the resurfacing project in 2020. In addition to the roadway conversion, the signal at McKnight Road and Larpenteur Avenue was upgraded. The previous signal phasing was split phase for the northbound and southbound movements on McKnight Road (i.e. northbound and southbound traffic can never go concurrently) and permissive left-turn movements for the eastbound and westbound directions on Larpenteur Avenue (i.e. there are never green arrows for the left-turns). The conversion from a four-lane section to a three-lane section on McKnight Road allowed for the installation of dedicated left turn lanes and the removal of the split phase. All four left-turn movements now have flashing yellow arrow indications. These improvements were implemented for the 2040 No Build & Build analysis, however they were not modeled in the 2020 existing analysis.

BACKGROUND GROWTH

Historical AADT data provided by MnDOT’s Interactive Traffic Data Application and the City of Maplewood 2040 Comprehensive Plan were reviewed to develop a background growth rate to develop forecast peak hour volumes at the study intersections for the Horizon Year (2040).

Table 1 provides a summary of the AADT information and the resultant growth rate. Based on the growth rates, a 0.5% annual growth rate was applied to the Existing traffic volumes to develop the 2040 No-Build turning movement volumes. **Exhibit 5** shows the 2040 No-Build turning movement volumes.

Table 1 – Annual Growth Rate Calculation

Street Segment	Most Recent AADT		Projected 2040 AADT		Annual Growth Rate
	Year	Volume	Year	Volume	
Larpenteur Avenue	2018	8,500	2040	9,400	0.5%
McKnight Road	2016	12,600	2040	13,300	0.2%

MASTER PLAN DEVELOPMENT APPROACHES

There are two master plan redevelopment approaches that have been developed for the site. These approaches focus on connecting the neighborhoods, sparking new economic and community development, blending the neighborhood, and conservation of natural features on the site today. The impacts of each Approach will be analyzed from a transportation perspective.

The trip-generating potential of both proposed approaches were calculated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, Tenth Edition*. Standard ITE trip rates were used to develop the total trips generated by the site. The average rate for ITE land uses were used to calculate the trip generation potential of the site.

The public park land use trip generation was obtained by using StreetLight data to determine the activity at four similar parks in Saint Paul. Streetlight Data uses big data collected from smart phones and navigation devices in vehicles to estimate traffic volumes and origin/destination patterns. StreetLight data was utilized to obtain historic data because data collected in the field would have been artificially low due to the COVID-19 pandemic. Those parks reviewed included: Prosperity Heights Park, Mattocks Park, Baker Park, and Cayuga Park. The park trip generation rate was determined by taking the daily, AM peak, and PM peak averages between the parks based on their size (acres). The data used was averaged using data from March 2019 through September 2019 on weekdays.

The internal capture rate was calculated for the approaches based on the ITE Trip Generation Manual to determine a percentage of trips that would be destined to another land use within the site and not utilize the exterior roadways. With mainly housing and office/light industrial land uses in the approaches, it is not anticipated that there will be a high percentage of internal capture.

MULTIMODAL REDUCTIONS

Based on the transit ridership previously discussed, there are currently 17 daily transit trips at the bus stops immediately adjacent to the site. With the redevelopment it was assumed that transit ridership would increase, and the majority of the transit trips were to occur in the peak periods. A 2.5% transit reduction was assumed for site. Both of the redevelopment approaches are projected to generate around 1,000 peak hour trips, which would result in 25 transit trips in each peak hour. This more modest reduction in transit trips was assumed because the site is located on the edge of the City of St. Paul farther from locations that have better transit service and because there are not significant improvements in transit service planned at this time. This percentage could increase if transit routes were rerouted closer to the site. Per discussions with Metro Transit, any changes to transit routes are will be reanalyzed as part of Network Next in 2021.

The City of St. Paul's goal is to increase the bicycle mode share to 5%. While this goal is feasible in the core of the City, the Hillcrest site is in the northeast corner of the city which is far less dense. The development will focus on providing substantial trail and sidewalk connections throughout the site and to the adjacent neighborhoods so it is anticipated that a higher percentage of trips within the site will be walking or bicycling between the housing, community node, and active park. However, off site retail and services are not immediately adjacent to the site which would lower the number of exterior site trips for pedestrians and bicyclists. Therefore, it was assumed that a 2.5% bicycle mode split would be more feasible for the site. The 2040 proposed bike plan routes near the Hillcrest site are shown in **Exhibit 6**.

Transit use and bicycle use will therefore result in a reduction of 5% of the vehicular trips.

DESIRED SITE ACCESS

Per discussions with Ramsey County, three roadway accesses along McKnight Road and one access on Larpenteur Avenue is preferred. Ramsey County access spacing guidelines for full access is 480 feet along Minor Arterials/Collector roadways like McKnight Road and Larpenteur Avenue.

The current site is a barrier for all modes of transportation destined to the east from the Hayden Heights neighborhood. Reconnecting the street grid and providing multiple connections to the neighborhood is a priority for the City of St. Paul. This includes roadway, pedestrian, and bicycle connections.

APPROACH 1: HILLTOP

Approach 1, named Hilltop, focuses on conserving and making the wetlands and hill crest central features as much as possible on the site. This Approach provides one community node on the northern portion of the site.

Approach 1 provides accesses to Larpenteur Avenue, McKnight Road, Ivy Avenue, and Winthrop Street. There is one primary access off Larpenteur Avenue at Howard Street which is the spine road that runs the entire length of the development. There are three proposed accesses along McKnight Road; the three McKnight Road accesses are located at Arlington Avenue, Montana Avenue, and roughly 490 feet south of Larpenteur Avenue. The three proposed accesses satisfy Ramsey County access spacing guidelines for full accesses. There is one additional access shown on the plan that will be converted to a pedestrian and bicycle connection. This connection was shown to delineate between blocks on site.

There will be one access to Ivy Avenue that is aligned with Hawthorne Avenue. To the west there are two roadway accesses to the neighborhood, one is aligned with Nebraska Avenue and the other is just North of Hoyt Avenue. Winthrop Street will be connected from Ivy Avenue to Sherwood Avenue to improve connectivity and access to the existing neighborhood as well as future development. With this approach there is potential in the future for Winthrop Street to be connected between Larpenteur Avenue and Hoyt, further improving the connectivity and functionality of the roadway network. This connection can be made with either Approach, but it will not occur in the first phase of development.

Approach 1 provides multiple trail connections from the neighborhood to the west to the trail along McKnight Road. Trail connections are shown at Sherwood Avenue and north of Arlington Avenue. A trail connection will also be provided north of Hoyt Ave to connect the Furness Trail to the Hillcrest site. All new roadways on site will also provide sidewalks to connect to the neighborhood.

Based on the site metrics provided by Cunningham Group, the proposed site would include the following land uses:

- 686,805 square feet of general light industrial
- 774 units of low-rise multi-family housing
- 377 units of mid-rise multi-family housing
- 5.7-acre active park

The trip generation for Approach 1 is shown in **Table 2** below. Based on the proposed land uses, the internal capture rate is anticipated to be around 5%.

Table 2 – Approach 1: Hilltop – Trip Generation

Land Use Description	ITE	Intensity / Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
General Light Industrial	110	686,805 Square Feet	3,407	423	58	481	56	377	433
Multifamily Housing (Low-Rise)	220	774 Dwelling Units	5,666	82	274	356	273	160	433
Multifamily Housing (Mid-Rise)	221	377 Dwelling Units	2,051	35	101	136	101	65	166
Public Park	411	5.7 Acres	209	4	2	6	11	9	20
TOTAL SITE TRIPS			11,332	544	435	979	441	611	1,052
ROUNDED TOTAL SITE TRIPS			11,330	545	435	980	440	610	1,050
SITE TRIPS MINUS INTERNAL CAPTURE (5%) & MULTIMODAL REDUCTION (5%)			10,195	490	390	880	395	550	945

APPROACH 2: JOBS FOCUS

Approach 2, named Jobs Focus, focuses on redeveloping the site to maximize land uses that increase employment while still preserving high value wetland areas and adding an active park on the site. This Approach provides one community node on the northern portion of the site.

Approach 2 provides accesses to Larpenteur Avenue, McKnight Road, Ivy Avenue, and Winthrop Street. There is one primary access off Larpenteur Avenue at Howard Street which is the spine road that runs through the development and curves to connect to McKnight Road at Arlington Avenue. There are three proposed accesses along McKnight Road; the three McKnight Road accesses are located at Arlington Avenue, Montana Avenue, and roughly 265 feet south of Larpenteur Avenue. The northern most access on McKnight Road does not satisfy Ramsey County access spacing guidelines for a full access. This access should be restricted to a right-in/right-out. The other access points on Larpenteur Avenue and McKnight Road will provide full access.

There will be one access to Ivy Avenue that is aligned with Hawthorne Avenue. To the west there are three roadway accesses to the neighborhood: one is aligned with Arlington Avenue, one is aligned with Nebraska Avenue, and the other is just North of Hoyt Avenue. Winthrop Street will be connected from Ivy Avenue to Sherwood Avenue to improve connectivity and access to the existing neighborhood as well as future development. With this approach there is potential in the future for Winthrop Street to be connected between Larpenteur Avenue and Hoyt, further improving the connectivity and functionality of the roadway network. This connection can be made with either Approach, but it will not come in the first phase of development.

Approach 2 provides multiple trail connections from the neighborhood to the west to the trail along McKnight Road. Trail connections are provided at Arlington Avenue, Nebraska Avenue, and south of Hoyt Avenue. A trail connection will also be provided north of Hoyt Ave to connect the Furness Trail to the Hillcrest site. Approach 2 has fewer direct trail connections through the site compared to Approach 1. All new roadways on site will also provide sidewalks to connect to the neighborhood

Based on the site metrics provided by Cunningham Group, the proposed site would include the following land uses:

- 834,588 square feet of general light industrial

- 779 units of low-rise multi-family housing
- 124 units of mid-rise multi-family housing
- 4.8-acre active park

The trip generation for Approach 2 is shown in **Table 3** below. Based on the proposed land uses, the internal capture rate is anticipated to be around 5%.

Table 3 – Approach 2: Job Focus – Trip Generation

Land Use Description	ITE	Intensity / Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
General Light Industrial	110	834,588 Square Feet	4,140	514	70	584	68	458	526
Multifamily Housing (Low-Rise)	220	779 Dwelling Units	5,702	82	276	358	275	161	436
Multifamily Housing (Mid-Rise)	221	124 Dwelling Units	675	12	33	45	34	21	55
Public Park	411	4.8 Acres	176	3	2	5	9	8	17
TOTAL SITE TRIPS			10,693	611	381	992	386	648	1,034
ROUNDED TOTAL SITE TRIPS			10,695	610	380	990	385	650	1,035
SITE TRIPS MINUS INTERNAL CAPTURE (5%) & MULTIMODAL REDUCTION (5%)			9,625	550	340	890	345	585	930

APPROACH 3: WETLAND GREEN EDGE

Approach 3, named Wetland Green Edge, focuses on preserving high value wetland areas on the east side of the site with industrial and housing along the wetlands and adding an active park on the site. This Approach provides one community node on the northern portion of the site.

Approach 3 provides accesses to Larpenteur Avenue, McKnight Road, Ivy Avenue, and Winthrop Street. There is one primary access off Larpenteur Avenue at Howard Street. There are two proposed accesses along McKnight Road; the two McKnight Road accesses are located at Arlington Avenue and Montana Avenue. The access points on Larpenteur Avenue and McKnight Road will provide full access.

There will be one access to Ivy Avenue that is offset from Hawthorne Avenue, this offset is not a desirable intersection configuration. To the west there are no roadway accesses to the neighborhood except one, just north of Hoyt Avenue.

Approach 3 provides multiple trail connections from the neighborhood to the west to the trail along McKnight Road. Trail connections are provided at Arlington Avenue and Montana Avenue. A trail connection will also be provided north of Hoyt Ave to connect the Furness Trail to the Hillcrest site. Approach 3 has fewer direct trail connections through the site compared to Approaches 1 & 2. This results in less pedestrian connectivity directly north to Larpenteur Avenue. All new roadways on site will provide sidewalks to connect to the neighborhood.

Based on the site metrics provided by Cunningham Group, the proposed site would provide a similar amount of industrial as the Hilltop Approach and slightly less residential. It is not anticipated that Wetland Green Edge would have a significantly different trip generation than Approaches 1 & 2, so traffic operations

are not anticipated to vary significantly from those Approaches that were analyzed in more detail. It is anticipated that there may be more congestion at the two intersections at McKnight Road given that there are fewer access points to McKnight Road under Approach 3 as compared to Approaches 1 & 2.

MASTER PLAN APPROACHS TO ANALYZE

Based on the trip generation of Approaches 1 & 2 master plan developments, the approaches are anticipated to generate between 880-890 trips in the AM peak hour and between 930-945 trips in the PM peak hour. Approach 3 was not analyzed.

Approach 1 will generate 880 AM peak hour trips and 945 PM peak hour trips which will be dispersed over 6 accesses. It will consist of one community node on the north end of the site with industrial land uses located in the middle and south portions of the site. There will be additional residential along the southwest of the site that borders the existing neighborhood and dense residential on the northern portion of the site. Approach 1 has the fewest connections to the Hayden Heights neighborhood, located west of the Hillcrest site between Larpenteur Avenue on the north and the railroad tracks on the south, out of the two approaches.

Approach 2 will generate 890 AM peak hour trips and 930 PM peak hour trips which will be dispersed over 8 accesses. It will consist of one community node on the north end of the site with the office and industrial located in the middle portion of the site. There will be additional residential along the west side and south edge of the site that borders the existing neighborhood. Dense residential development will be on the northern portion of the site. Approach 2 has good connectivity to the Hayden Heights neighborhood with more neighborhood connections than Approach 1.

The difference in the trips is minimal, therefore, the number of access points and where the accesses are located were more important in determining significant traffic impacts of the two approaches. Another consideration is the potential traffic impacts on the Hayden Heights neighborhood to the west of the site. More connections to the neighborhood have the benefit of avoiding any one individual street from seeing a dramatic increase in traffic since traffic is dispersed onto more roadways.

SITE TRIP DISTRIBUTION

The site trips were distributed to adjacent roadways based on the current traffic patterns in the area and a general assessment of the major regional roadways surrounding the study area. An origin and destination study was also completed in StreetLight for the surrounding neighborhoods, this analysis was used to help determine the distribution for the proposed residential developments on the Hillcrest site. The following global trip distribution was assumed for Approach 1:

- 30% to/from the west on Larpenteur Avenue towards White Bear Avenue
- 25% to/from the north on McKnight Road
- 10% to/from the east on Larpenteur Avenue
- 25% to/from the south on McKnight Road
- 5% to/from the west/southwest on Ivy Avenue, Orange Avenue, and Hawthorne Avenue
- 5% to/from the west on various roadways in the Hayden Heights Neighborhood

Exhibit 7 shows the distribution for Approach 1, the Hilltop Build scenario.

The following global trip distribution was assumed for Approach 2:

- 20% to/from the west on Larpenteur Avenue towards White Bear Avenue
- 25% to/from the north on McKnight Road
- 10% to/from the east on Larpenteur Avenue
- 25% to/from the south on McKnight Road
- 10% to/from the west/southwest on Ivy Avenue, Orange Avenue, and Hawthorne Avenue
- 10% to/from the west on various roadways in the Hayden Heights Neighborhood

Exhibit 8 shows the distribution for Approach 2, the Jobs Focus Build scenario.

The difference in the distribution patterns for the two approaches is the amount of traffic that is anticipated to travel through the Hyden Park neighborhood. Approach 2 provides more residential development on the south and west sides of the site than Approach 1. Approach 2 also provides an additional roadway connection at Arlington Avenue that is not present in Approach 1.

In both approaches, neighborhood streets should be signed to not allow commercial cut through traffic. All trucks on the Hillcrest site should use accesses on McKnight Road or Larpenteur Avenue.

CAPACITY ANALYSIS

A capacity analysis was performed to quantify the delay and level of service at the study intersections during the weekday AM and PM peak hours. The capacity analysis was performed using Synchro/SimTraffic.

The capacity of an intersection quantifies its ability to accommodate traffic volumes and is measured in average delay per vehicle. It is expressed in terms of level of service (LOS) which ranges from A to F, with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions). The LOS grades shown below, which are provided in the Transportation Research Board's Highway Capacity Manual (HCM), quantify and categorize the driver's discomfort, frustration, fuel consumption, and travel times experienced as a result of intersection control and the resulting traffic queuing. A detailed description of each LOS rating can be found in **Table 4**. The range of control delay for each rating (as detailed in the HCM) is also shown in **Table 4**. Because signalized intersections are expected to carry a larger volume of vehicles and stopping is required during red time, higher delays are tolerated for the corresponding LOS ratings. For side street stop intersections, the intersection LOS is reported as the worst side street movement.

Table 4 – Level of Service Information

Level of Service	Average Control Delay (seconds/vehicle)	Description
A	0-10 (Unsignalized); 0-10 (Signalized)	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B	>10-15 (Unsignalized); >10-20 (Signalized)	Minor control delay at signalized intersections; traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream.
C	>15-25 (Unsignalized); >20-35 (Signalized)	Moderate control delay; movement within traffic stream more restricted than at LOS B; formation of queues contributes to lower average travel speeds.
D	>25-35 (Unsignalized); >35-55 (Signalized)	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E	>35-50 (Unsignalized); >55-80 (Signalized)	High control delay; average travel speed no more than 33 percent of free flow speed.
F	>50 (Unsignalized); >80 (Signalized)	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

Traffic models for each scenario were developed using Synchro/SimTraffic, and the delay and queueing were evaluated for each scenario. The scenarios that were analyzed are as follows:

- Existing (2020)
- Horizon Year No-Build (2040)
- Horizon Year Approach 1 Build (2040)
- Horizon Year Approach 2 Build (2040)

EXISTING YEAR (2020) CONDITIONS

The traffic volumes shown in **Exhibit 4** were used in the Existing Conditions analysis. It should be noted that improvements to convert McKnight Road from a four-lane to a three-lane roadway with bike lanes were completed in 2020, however this modeling was completed before the project was completed. For existing conditions McKnight Road was modeled with a four-lane cross section with no signal timing or phasing adjustments. **Tables 5 & 6** show the level-of-service (LOS) and delay for the study intersections under Existing Conditions during the AM and PM peak hour, respectively.

Based on the analysis, the study intersections are currently operating at a LOS C or better during the AM peak hour. In the PM peak hour, Larpenteur Avenue & McKnight Road experiences undesirable delays for the eastbound and westbound movements, however, the intersection operates at LOS D.

Table 5 – Existing (2020) AM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Avenue & Howard Street	Side Street Stop	EB	2.4	A	0.3	A	-	-	7.2	A
		WB	-	-	1.6	A	1.6	A		
		NB	-	-	-	-	-	-		
		SB	7.2	A	-	-	3.9	A		
McKnight Road & Larpenteur Avenue	Signal	EB	54.5	D	45.7	D	8.1	A	32.3	C
		WB	52.9	D	47.8	D	7.8	A		
		NB	31.5	C	32.3	C	23.4	C		
		SB	38.0	D	34.1	C	14.6	B		
McKnight Road & Montana Avenue	Side Street Stop	EB	-	-	-	-	-	-	10.2	B
		WB	10.2	B	-	-	3.7	A		
		NB	-	-	0.3	A	0.0	A		
		SB	4.6	A	3.6	A	-	-		
McKnight Road & Nebraska Avenue	Side Street Stop	EB	-	-	-	-	-	-	10.3	B
		WB	10.3	B	-	-	2.7	A		
		NB	-	-	0.3	A	0.0	A		
		SB	2.9	A	0.5	A	-	-		
McKnight Road & Arlington Avenue	Side Street Stop	EB	-	-	-	-	-	-	9.5	A
		WB	9.5	A	-	-	2.9	A		
		NB	-	-	0.2	A	0.0	A		
		SB	3.1	A	0.7	A	-	-		
Ivy Avenue & Hawthorne Avenue	Side Street Stop	EB	-	-	0.1	A	0.1	A	4.2	A
		WB	2.1	A	0.3	A	-	-		
		NB	4.2	A	-	-	2.7	A		
		SB	-	-	-	-	-	-		

Table 6 – Existing (2020) PM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Avenue & Howard Street	Side Street Stop	EB	4.4	A	3.8	A	-	-	6.7	A
		WB	-	-	1.7	A	1.4	A		
		NB	-	-	-	-	-	-		
		SB	6.7	A	-	-	3.7	A		
McKnight Road & Larpenteur Avenue	Signal	EB	77.5	E	89.5	F	35.6	D	44.0	D
		WB	57.7	E	57.0	E	11.6	B		
		NB	34.8	C	34.9	C	26.0	C		
		SB	35.6	D	36.9	D	17.8	B		
McKnight Road & Montana Avenue	Side Street Stop	EB	-	-	-	-	-	-	8.9	A
		WB	8.9	A	-	-	3.2	A		
		NB	-	-	0.5	A	0.1	A		
		SB	7.9	A	3.8	A	-	-		
McKnight Road & Nebraska Avenue	Side Street Stop	EB	-	-	-	-	-	-	10.4	B
		WB	10.4	B	-	-	3.5	A		
		NB	-	-	0.4	A	0.1	A		
		SB	1.9	A	0.6	A	-	-		
McKnight Road & Arlington Avenue	Side Street Stop	EB	-	-	-	-	-	-	12.0	B
		WB	12.0	B	-	-	3.0	A		
		NB	-	-	0.3	A	0.1	A		
		SB	3.2	A	0.7	A	-	-		
Ivy Avenue & Hawthorne Avenue	Side Street Stop	EB	-	-	0.2	A	-	-	6.7	A
		WB	2.1	A	0.2	A	-	-		
		NB	6.7	A	-	-	2.9	A		
		SB	-	-	-	-	-	-		

HORIZON YEAR NO-BUILD (2040) CONDITIONS

The traffic volumes shown in **Exhibit 5** were used in the 2040 No Build analysis. **Tables 7 & 8** show the LOS and delay for the study intersections under 2040 No Build Conditions during the AM and PM peak hours, respectively. Based on the analysis, the study intersections are anticipated to operate at a LOS C or better during the AM and PM peak hour. The operations at McKnight Road & Larpenteur Avenue improved during both the AM & PM peak hours compared to the existing condition. This is due to the removal of the split phase at the intersection. The SimTraffic reports are provided in **Appendix C**.

Table 7 – Horizon Year No-Build (2040) AM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Avenue & Howard Street	Side Street Stop	EB	2.7	A	0.5	A	-	-	8.1	A
		WB	-	-	1.7	A	1.3	A		
		NB	-	-	-	-	-	-		
		SB	8.1	A	-	-	3.7	A		
McKnight Road & Larpenteur Avenue	Signal	EB	39.5	D	36.7	D	14.2	B	23.8	C
		WB	44.2	D	38.2	D	10.3	B		
		NB	22.4	C	17.8	B	13.4	B		
		SB	18.3	B	25.6	C	19.4	B		
McKnight Road & Montana Avenue	Side Street Stop	EB	-	-	-	-	-	-	19.3	C
		WB	19.3	C	-	-	6.7	A		
		NB	-	-	0.8	A	0.3	A		
		SB	4.2	A	4.0	A	-	-		
McKnight Road & Nebraska Avenue	Side Street Stop	EB	-	-	-	-	-	-	14.7	B
		WB	14.7	B	-	-	4.2	A		
		NB	-	-	0.7	A	0.2	A		
		SB	2.6	A	0.8	A	-	-		
McKnight Road & Arlington Avenue	Side Street Stop	EB	-	-	-	-	-	-	19.3	C
		WB	19.3	C	-	-	5.0	A		
		NB	-	-	0.6	A	0.1	A		
		SB	3.1	A	1.1	A	-	-		
Ivy Avenue & Hawthorne Avenue	Side Street Stop	EB	-	-	0.1	A	0.0	A	4.1	A
		WB	2.1	A	0.3	A	-	-		
		NB	4.1	A	-	-	2.7	A		
		SB	-	-	-	-	-	-		

Table 8 – Horizon Year No-Build (2040) PM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Avenue & Howard Street	Side Street Stop	EB	3.8	A	0.6	A	-	-	10.0	A
		WB	-	-	1.8	A	1.6	A		
		NB	-	-	-	-	-	-		
		SB	10.0	A	-	-	3.9	A		
McKnight Road & Larpenteur Avenue	Signal	EB	48.5	D	42.6	D	15.7	B	29.3	C
		WB	41.8	D	37.5	D	15.2	B		
		NB	26.2	C	27.9	C	25.1	C		
		SB	25.9	C	26.9	C	19.6	B		
McKnight Road & Montana Avenue	Side Street Stop	EB	-	-	-	-	-	-	11.8	B
		WB	11.8	B	-	-	7.3	A		
		NB	-	-	1.3	A	0.4	A		
		SB	6.3	A	4.0	A	-	-		
McKnight Road & Nebraska Avenue	Side Street Stop	EB	-	-	-	-	-	-	12.5	B
		WB	12.5	B	-	-	7.2	A		
		NB	-	-	1.1	A	0.6	A		
		SB	3.2	A	0.7	A	-	-		
McKnight Road & Arlington Avenue	Side Street Stop	EB	-	-	-	-	-	-	18.5	C
		WB	18.5	C	-	-	6.3	A		
		NB	-	-	0.9	A	0.2	A		
		SB	3.6	A	1.0	A	-	-		
Ivy Avenue & Hawthorne Avenue	Side Street Stop	EB	-	-	0.1	A	-	-	5.0	A
		WB	2.2	A	0.3	A	-	-		
		NB	5.0	A	-	-	3.0	A		
		SB	-	-	-	-	-	-		

HORIZON YEAR APPROACH 1 BUILD (2040) CONDITIONS

The traffic volumes shown in **Exhibit 9** were used in the 2040 Approach 1 Build analysis. **Tables 9 & 10** show the LOS and delay for the study intersections under 2040 Approach 1 Build Conditions during the AM and PM peak hours, respectively. It was assumed that all accesses on McKnight Road would have a single lane approach and that no roadway expansions would be made on McKnight Road or Larpenteur Avenue to accommodate additional lanes.

Based on the analysis, the study intersections are anticipated to operate at a LOS D or better during the AM and PM peak hours, Except for the northernmost site access onto McKnight Road which operates at LOS E in the AM peak hour and a LOS F in the PM peak hour. The poor LOS is caused by the eastbound left turns which has difficulty finding gaps and are impacted by the northbound queues on McKnight Road. It is recommended to only allow right-in/right-out movements at the northern access even through it meets access spacing guidelines for a full access. It is not anticipated that any of the accesses on McKnight Road

will meet signal warrants. If accesses along McKnight Road are consolidated, then a signal may be warranted.

The operations at the site accesses on Larpenteur Avenue are acceptable during both the AM & PM peak hours and traffic control mitigation would not be required. The SimTraffic reports are provided in **Appendix C**.

Exhibit 10 shows the 2040 no build daily traffic, projected increase in daily traffic, and 2040 build daily traffic forecast on the roadways within the study area. These estimates were created based on peak hour turning movement counts and the estimated trip generation for the number of houses on each block. It is anticipated that Nebraska Avenue, Arlington Avenue, Sherwood Avenue, Cottage Avenue, and Clear Avenue would increase by a combined 500 vpd and Ivy Avenue, Orange Avenue, and Hawthorne Avenue would also increase by a combined 500 vpd. Based on where the roadway connections are for Approach 1, it is unlikely that traffic volumes will grow beyond levels that are expected on a local street.

Table 9 – Horizon Year Approach 1 Build (2040) AM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Ave & Howard St	Side Street Stop	EB	3.0	A	1.7	A	0.9	A	15.8	C
		WB	6.5	A	2.8	A	2.4	A		
		NB	15.8	C	-	-	9.9	A		
		SB	11.2	B	-	-	4.9	A		
Larpenteur Ave & McKnight Rd	Signal	EB	45.0	D	38.9	D	25.9	C	32.0	C
		WB	47.7	D	52.6	D	36.2	D		
		NB	30.5	C	19.2	B	12.7	B		
		SB	27.1	C	34.0	C	28.3	C		
Montana Ave & McKnight Rd	Side Street Stop	EB	21.9	C	-	-	10.5	B	24.0	C
		WB	24.0	C	-	-	10.8	B		
		NB	4.8	A	0.9	A	0.1	A		
		SB	5.1	A	3.0	A	1.9	A		
Nebraska Ave & McKnight Rd	Side Street Stop	EB	-	-	-	-	-	-	14.5	B
		WB	14.5	B	-	-	4.5	A		
		NB	-	-	0.8	A	0.2	A		
		SB	4.6	A	1.1	A	-	-		
Arlington Ave & McKnight Rd	Side Street Stop	EB	27.0	D	-	-	13.5	B	27.0	D
		WB	25.4	D	-	-	7.1	A		
		NB	6.8	A	1.1	A	0.2	A		
		SB	4.2	A	2.8	A	1.1	A		
Hawthorne Ave & Ivy Ave	Side Street Stop	EB	1.9	A	0.2	A	0.1	A	6.7	A
		WB	2.1	A	0.3	A	-	-		
		NB	4.5	A	6.6	A	2.8	A		
		SB	-	-	6.7	A	2.5	A		
Northern Site Access & McKnight Rd	Side Street Stop	EB	38.9	E	-	-	15.8	C	38.9	E
		WB	-	-	-	-	-	-		
		NB	9.4	A	2.1	A	-	-		
		SB	-	-	5.0	A	2.9	A		

Table 10 – Horizon Year Approach 1 Build (2040) PM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Ave & Howard St	Side Street Stop	EB	5.2	A	1.8	A	1.0	A	16.9	C
		WB	6.1	A	2.6	A	2.2	A		
		NB	23.1	C	-	-	15.6	C		
		SB	16.9	C	-	-	5.1	A		
Larpenteur Ave & McKnight Rd	Signal	EB	47.9	D	48.0	D	33.1	C	31.6	C
		WB	38.2	D	40.7	D	29.9	C		
		NB	23.5	C	28.1	C	22.0	C		
		SB	33.9	C	25.0	C	17.8	B		
Montana Ave & McKnight Rd	Side Street Stop	EB	24.7	C	-	-	9.5	A	24.7	C
		WB	23.6	C	-	-	8.5	A		
		NB	3.9	A	1.4	A	0.4	A		
		SB	6.6	A	2.4	A	1.9	A		
Nebraska Ave & McKnight Rd	Side Street Stop	EB	-	-	-	-	-	-	19.3	C
		WB	19.3	C	-	-	9.0	A		
		NB	-	-	1.4	A	0.7	A		
		SB	5.8	A	0.9	A	-	-		
Arlington Ave & McKnight Rd	Side Street Stop	EB	31.6	D	-	-	19.8	C	31.6	D
		WB	15.4	C	-	-	6.1	A		
		NB	5.5	A	1.5	A	0.7	A		
		SB	6.5	A	2.2	A	0.8	A		
Hawthorne Ave & Ivy Ave	Side Street Stop	EB	2.2	A	0.1	A	-	-	6.8	A
		WB	2.1	A	0.3	A	-	-		
		NB	4.6	A	6.8	A	2.8	A		
		SB	-	-	6.3	A	3.2	A		
Northern Site Access & McKnight Rd	Side Street Stop	EB	96.3	F	-	-	64.6	F	96.3	F
		WB	-	-	-	-	-	-		
		NB	9.3	A	4.3	A	-	-		
		SB	-	-	4.4	A	2.5	A		

HORIZON YEAR APPROACH 2 BUILD (2040) CONDITIONS

The traffic volumes shown in **Exhibit 11** were used in the 2040 Approach 2 Build analysis. **Tables 11 & 12** show the LOS and delay for the study intersections under 2040 Approach 2 Build Conditions during the AM and PM peak hours, respectively. It was assumed that all accesses on McKnight Road would have a single lane approach and that no roadway expansions would be made on McKnight Road or Larpenteur Avenue to accommodate additional lanes. Operations for Approach 2 are similar to Approach 1.

Based on the analysis, the study intersections are anticipated to operate at a LOS D or better during the AM and PM peak hour except for the side street stop-controlled intersection of McKnight Road and Montana Avenue. The worst movement is expected to operate LOS E in both the AM peak hour and LOS F in the

PM peak. This is not uncommon for side street stop-controlled intersections on higher volume roadways like McKnight Road. There are no side street queuing issues in either peak hour. It is not anticipated that any of the accesses on McKnight Road will meet signal warrants.

The operations at the site accesses on Larpenteur Avenue are acceptable during both the AM & PM peak hours and traffic control mitigation would not be required. The SimTraffic reports are provided in **Appendix C**.

Exhibit 12 shows the 2040 no build daily traffic, projected increase in daily traffic, and 2040 build daily traffic forecast on the roadways within the study area. As previously mentioned, these estimates were created based on peak hour turning movement counts and the estimated trip generation for the number of houses on each block. It is anticipated that Nebraska Avenue, Arlington Avenue, Sherwood Avenue, Cottage Avenue, and Clear Avenue would increase by a combined 1000 vpd and Ivy Avenue, Orange Avenue, and Hawthorne Avenue would also increase by a combined 1000 vpd. It is unlikely that traffic volumes will grow beyond levels that are expected on a local street.

Table 11 – Horizon Year Approach 2 Build (2040) AM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Ave & Howard St	Side Street Stop	EB	3.4	A	1.3	A	0.7	A	10.5	B
		WB	5.0	A	2.8	A	2.2	A		
		NB	10.5	B	-	-	4.6	A		
		SB	10.3	B	-	-	4.9	A		
Larpenteur Ave & McKnight Rd	Signal	EB	44.6	D	42.5	D	27.2	C	31.4	C
		WB	54.4	D	51.9	D	35.4	D		
		NB	30.2	C	16.8	B	11.7	B		
		SB	24.1	C	32.2	C	23.4	C		
Montana Ave & McKnight Rd	Side Street Stop	EB	35.8	E	-	-	18.9	C	35.8	E
		WB	31.9	D	-	-	13.6	B		
		NB	6.7	A	1.1	A	0.2	A		
		SB	6.1	A	4.5	A	2.6	A		
Nebraska Ave & McKnight Rd	Side Street Stop	EB	-	-	-	-	-	-	14.4	B
		WB	14.4	B	-	-	10.2	B		
		NB	-	-	0.9	A	0.5	A		
		SB	4.8	A	1.6	A	-	-		
Arlington Ave & McKnight Rd	Side Street Stop	EB	27.0	D	-	-	10.3	B	27.0	D
		WB	22.3	C	-	-	6.2	A		
		NB	5.8	A	1.2	A	0.5	A		
		SB	3.4	A	2.0	A	0.6	A		
Hawthorne Ave & Ivy Ave	Side Street Stop	EB	1.9	A	0.3	A	0.4	A	6.3	A
		WB	2.0	A	0.3	A	-	-		
		NB	5.0	A	6.3	A	2.9	A		
		SB	-	-	6.3	A	2.6	A		
Larpenteur Ave and Winthrop St	Side Street Stop	EB	-	-	1.0	A	0.6	A	10.0	A
		WB	-	-	0.9	A	-	-		
		NB	10.0	A	-	-	-	-		
		SB	-	-	-	-	-	-		
Northern Site Access & McKnight Rd	Side Street Stop	EB	-	-	-	-	9.5	A	9.5	A
		WB	-	-	-	-	-	-		
		NB	-	-	4.7	A	-	-		
		SB	-	-	3.6	A	1.7	A		

Table 12 – Horizon Year Approach 2 Build (2040) PM Peak Hour Intersection Analysis

Intersection	Control	Approach	Operations by Movement						Overall Intersection	
			Left		Through		Right			
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Larpenteur Ave & Howard St	Side Street Stop	EB	4.9	A	1.9	A	0.8	A	15.0	B
		WB	5.2	A	2.6	A	1.8	A		
		NB	12.7	B	-	-	7.9	A		
		SB	15.0	B	-	-	3.6	A		
Larpenteur Ave & McKnight Rd	Signal	EB	56.3	E	50.5	D	40.9	D	32.6	C
		WB	41.8	D	43.2	D	28.7	C		
		NB	23.9	C	25.1	C	17.3	B		
		SB	37.1	D	25.8	C	18.9	B		
Montana Ave & McKnight Rd	Side Street Stop	EB	53.2	F	-	-	37.2	E	53.2	F
		WB	21.8	C	-	-	10.0	A		
		NB	5.6	A	1.9	A	0.6	A		
		SB	8.7	A	3.2	A	1.7	A		
Nebraska Ave & McKnight Rd	Side Street Stop	EB	-	-	-	-	-	-	18.7	C
		WB	18.7	C	-	-	5.4	A		
		NB	-	-	1.3	A	0.7	A		
		SB	5.0	A	1.2	A	-	-		
Arlington Ave & McKnight Rd	Side Street Stop	EB	25.1	D	-	-	11.0	B	26.3	D
		WB	26.3	D	-	-	9.2	A		
		NB	4.0	A	1.3	A	0.3	A		
		SB	6.3	A	1.9	A	0.5	A		
Hawthorne Ave & Ivy Ave	Side Street Stop	EB	2.1	A	0.2	A	-	-	6.8	A
		WB	2.1	A	0.3	A	-	-		
		NB	5.0	A	6.8	A	3.1	A		
		SB	-	-	6.7	A	3.4	A		
Larpenteur Ave & Winthrop St	Side Street Stop	EB	-	-	0.7	A	0.3	A	11.8	B
		WB	-	-	1.0	A	-	-		
		NB	11.8	B	-	-	-	-		
		SB	-	-	-	-	-	-		
Northern Site Access & McKnight Rd	Side Street Stop	EB	-	-	-	-	8.6	A	8.6	A
		WB	-	-	-	-	-	-		
		NB	-	-	22.9	C	-	-		
		SB	-	-	3.1	A	1.4	A		

MULTIMODAL CONNECTIONS

With both approaches it will be important to provide adequate trail and sidewalk connections to the surrounding network. **Exhibit 13** shows the existing and proposed trail/bike facilities and where connections could be made.

Pedestrian Facilities

Both approaches will provide sidewalks along all roadways throughout the Hillcrest development. The Hayden Heights neighborhood has sidewalks on some streets, but it is recommended to install sidewalks on all streets that will have a direct connection to the redevelopment. As previously mentioned, the City of St. Paul goal is to provide sidewalks on all city streets. However, there is no immediate plan to provide these improvements. Connecting the existing sidewalks to the Hillcrest site would provide access through the site prior to additional sidewalks being built in the Hayden neighborhood. With the conversion of McKnight Road from 4 lanes to 3 lanes, pedestrian refuge islands were installed at Hoyt Avenue, Montana Avenue, Nebraska Avenue, and Arlington Avenue to improve pedestrian crossings. When the Hillcrest site accesses are built at Montana Avenue and Arlington Avenue, the pedestrian refuge islands will need to be removed to accommodate the northbound left turn lanes. Pedestrian movements should be encouraged to cross at Hoyt Avenue and Nebraska Avenue where the pedestrian refuge areas will remain and provide connectivity to the city of Maplewood. On the north side of the site, Larpenteur Avenue should have pedestrian facilities installed as a part of the redevelopment.

Trail/Bicycle Facilities

Both approaches will provide a trail connection north of Hoyt Ave to Furness Trail on the west side of the site. When refining trail locations in either approach, it is imperative to provide a direct connection through the Hillcrest site to the trail along McKnight Road.

Per the City of St. Paul Bike plan, Ivy Avenue will provide an enhanced shared lane in the future that will run from the McKnight Road Trail to Prosperity Avenue. Both approaches will have a trail connection to Ivy Avenue at Hawthorne Avenue.

Arlington Avenue will also provide an enhanced shared lane. This enhanced lane will connect the Bruce Vento Trail to the Furness Trail. It is recommended to extend the enhanced bike lane to the Hillcrest site. Approach 2 provides a trail connection at Arlington Avenue, but Approach 1 has a connection between Arlington Avenue and Nebraska Avenue. It is recommended for Approach 1 that the trail connection be shifted south to align with Arlington Avenue.

Transit Facilities

To promote increased transit use, it is recommended, if feasible, to alter the existing transit routes to pass through the site. Which routes and the length of the routes extended will have to be analyzed once an Approach is selected and Metro Transit reanalyzes local bus routes as part of Network Next in 2021. **Exhibit 13** also shows the nearest routes that could be routed onto the site.

CONCLUSIONS AND RECOMMENDATIONS

The City of St. Paul is planning to redevelop the former Hillcrest Golf Club which was operational from 1921 to 2017. Kimley-Horn is assisting the Cunningham Group in developing the Hillcrest Redevelopment Master Plan for the City of St. Paul. The 112-acre site is currently vacant. Two concept redevelopment concepts have been developed for the site and this analysis is identify the expected impacts of each development and complete a transportation analysis of the two approaches. These plans focus on connecting the neighborhoods, sparking new economic and community development, blending the neighborhood, and the conservation of natural features on the site today.

Based on the current transit ridership in the area, a 2.5% transit reduction was assumed for the site. The development will focus on providing substantial trail and sidewalk connections throughout the site and to the adjacent neighborhoods. It is anticipated that a higher percentage of trips within the site will be walking or bicycling between the housing, community node, and active park. However, off site retail and services are not immediately adjacent to the site which would lower the number of exterior site trips for pedestrians and bicyclists. Therefore, it is assumed that a 2.5% bicycle mode split would be feasible for the site. This results in a 5% multimodal reduction for the site.

The trip generation of Approaches 1 & 2 will generate between 880-890 trips in the AM peak hour and between 930-945 trips in the PM peak hour.

The difference in the trips between the approaches is minimal, therefore, the number of access points and where the accesses are located were more critical in the impact on the surrounding roadway network. Another key component will be the traffic impacts on the neighborhood to the west of the site. The difference in the distribution patterns for the two approaches is the amount of traffic that is anticipated to filter through the Hyden Park neighborhood. Approach 2 provides more residential development on the south and west sides of the site than Approach 1. Approach 2 also provides an additional roadway connection at Arlington Avenue that is not present in Approach 1. Therefore, it is anticipated that Approach 2 will have a larger impact on traffic volumes on the neighborhood streets.

Approach 1 will generate 880 AM peak hour trips and 945 PM peak hour trips which will be dispersed over 6 accesses and Approach 2 will generate 890 AM peak hour trips and 930 PM peak hour trips which will be dispersed over 8 accesses.

A capacity analysis was performed for Existing (2020), Horizon Year No-Build (2040), Horizon Year Approach 1 Build (2040), and Horizon Year Approach 2 Build (2040).

The study intersections under Existing (2020) conditions are operating at a LOS C or better during the AM peak hour. In the PM peak hour, Larpenteur Avenue & McKnight Road experiences undesirable delays for the eastbound and westbound movements, however, the intersection operates at LOS D.

The operations at the study intersections in the Horizon Year No-Build (2040) are anticipated to operate at a LOS C or better during the AM and PM peak hour. The operations at McKnight Road & Larpenteur Avenue improved during both the AM & PM peak hours compared to the existing condition. This is due to the removal of the split phase at the intersection with the completion of the McKnight Road 4 lane to 3 lane conversion.

The study intersections in the Horizon Year Approach 1 Build (2040) are anticipated to operate at a LOS D or better during the AM and PM peak hour except for the northern-most side street stop-controlled intersections along McKnight Road. The site accesses worst movement are expected to operate LOS E in

the AM peak & LOS F PM peak. It is recommended to restrict this access to a right-in/right-out. There are no side street queuing issues in either peak hour. The operations at the site accesses on Larpenteur Avenue are acceptable during both the AM & PM peak hours and traffic control mitigation would not be required. It was assumed that all site accesses on McKnight Road would have single lane approaches.

The study intersections in the Horizon Year Approach 2 Build (2040) are anticipated to operate at a LOS D or better during the AM and PM peak hour except for the side street stop-controlled intersection of McKnight Road and Montana Avenue. The worst movement is expected to operate LOS E in both the AM peak hour and LOS F in the PM peak. This is not uncommon for side street stop-controlled intersections on higher volume roadways like McKnight Road. There are no side street queuing issues in either peak hour.

Approach 2 generates similar trips and has the same number of site accesses on McKnight Road as Approach 1 so side street volumes at each intersection are similar. Given the forecasted traffic volumes and that there are few movements that operate at poor LOS and those particular movement are only operating slightly outside of desirable ranges, it is not anticipated that any of the accesses on McKnight Road will satisfy signal warrants. The operations at the site accesses on Larpenteur Avenue are acceptable during both the AM & PM peak hours and traffic control mitigation would not be required.

The following multimodal recommendations are recommended around the site.

- Encourage pedestrian to utilize the McKnight crossings at Hoyt Avenue and Nebraska Avenue where the pedestrian refuge areas will remain and provide connectivity to the city of Maplewood.
- Extend the proposed enhanced shared lane on Arlington Avenue from the Furness Trail to the Hillcrest site and ensure on site trails align with the connection.
- Provide a direct connection to the Furness Trail north of Hoyt Avenue through the Hillcrest site to the McKnight Road trail.
- Improve multimodal connections to the west along existing local roads in the Hayden Heights Neighborhood. Arlington Avenue should be considered due to planned enhanced shared lanes west of the site and the location of the proposed trail within the Hillcrest site.
- Improve multimodal connections to the south along McKnight Road to provide improved connection to multimodal facilities to the south of the site and to the transit stop for Route 74 at McKnight Road and Maryland Avenue.

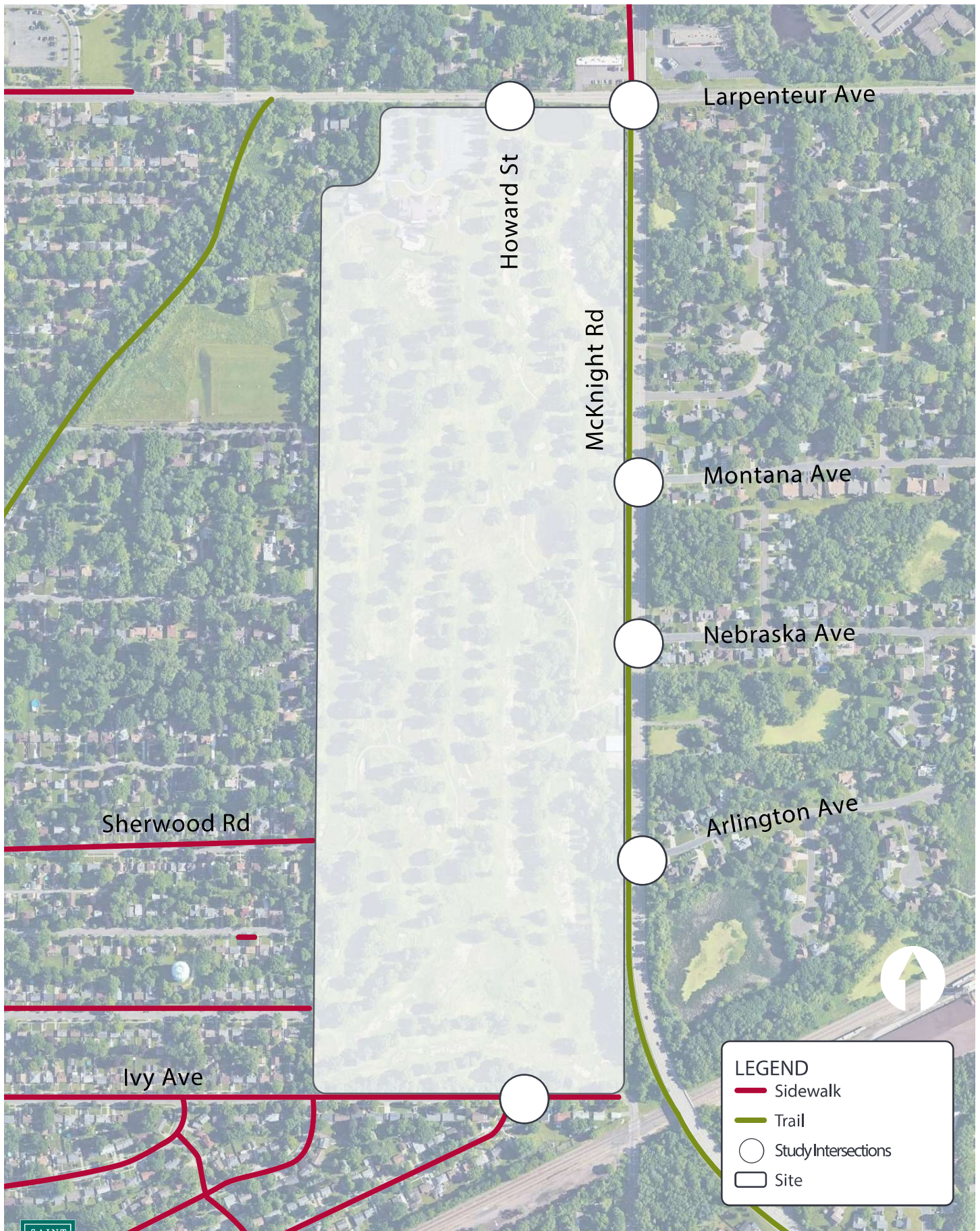
APPENDIX

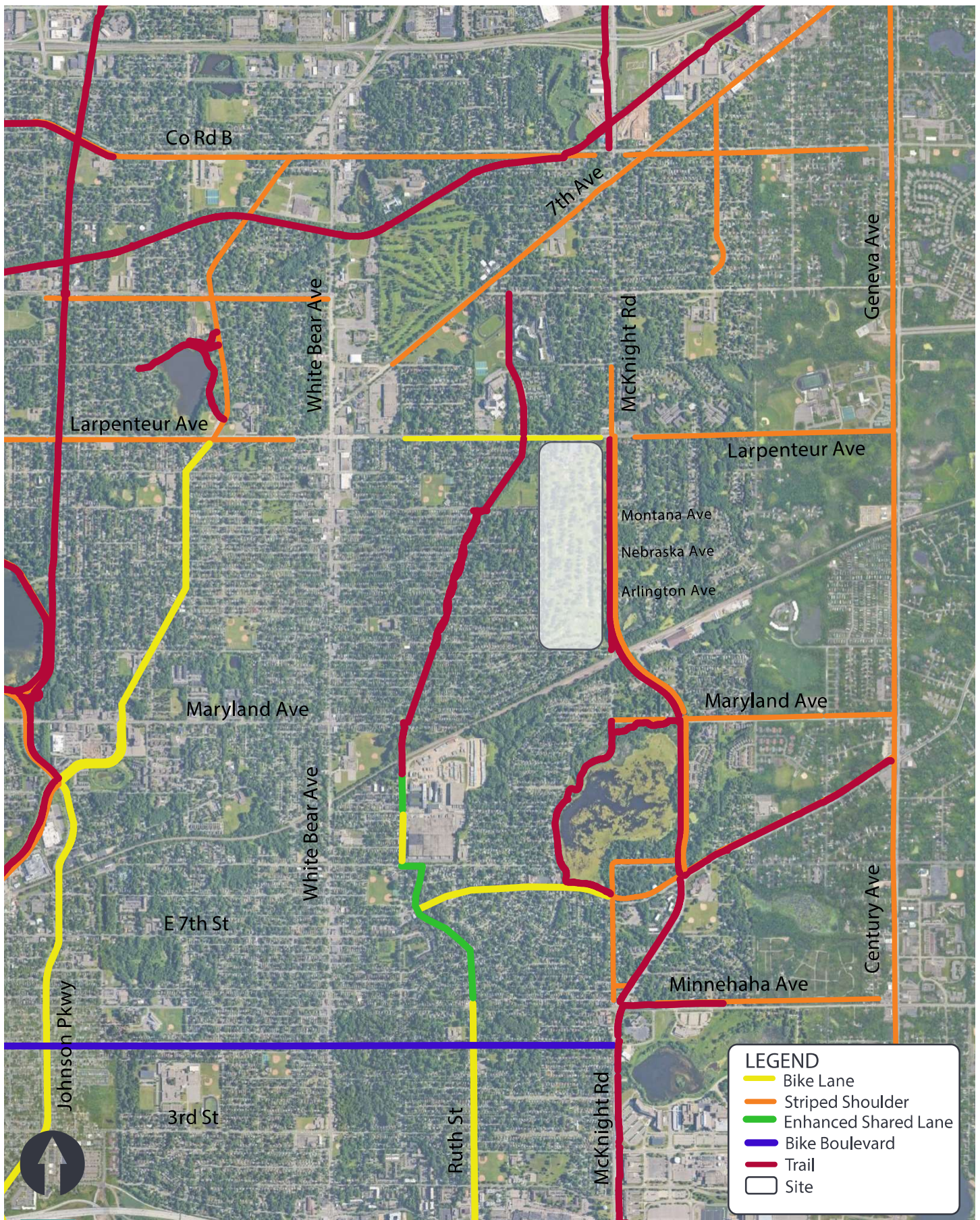
A. Exhibits

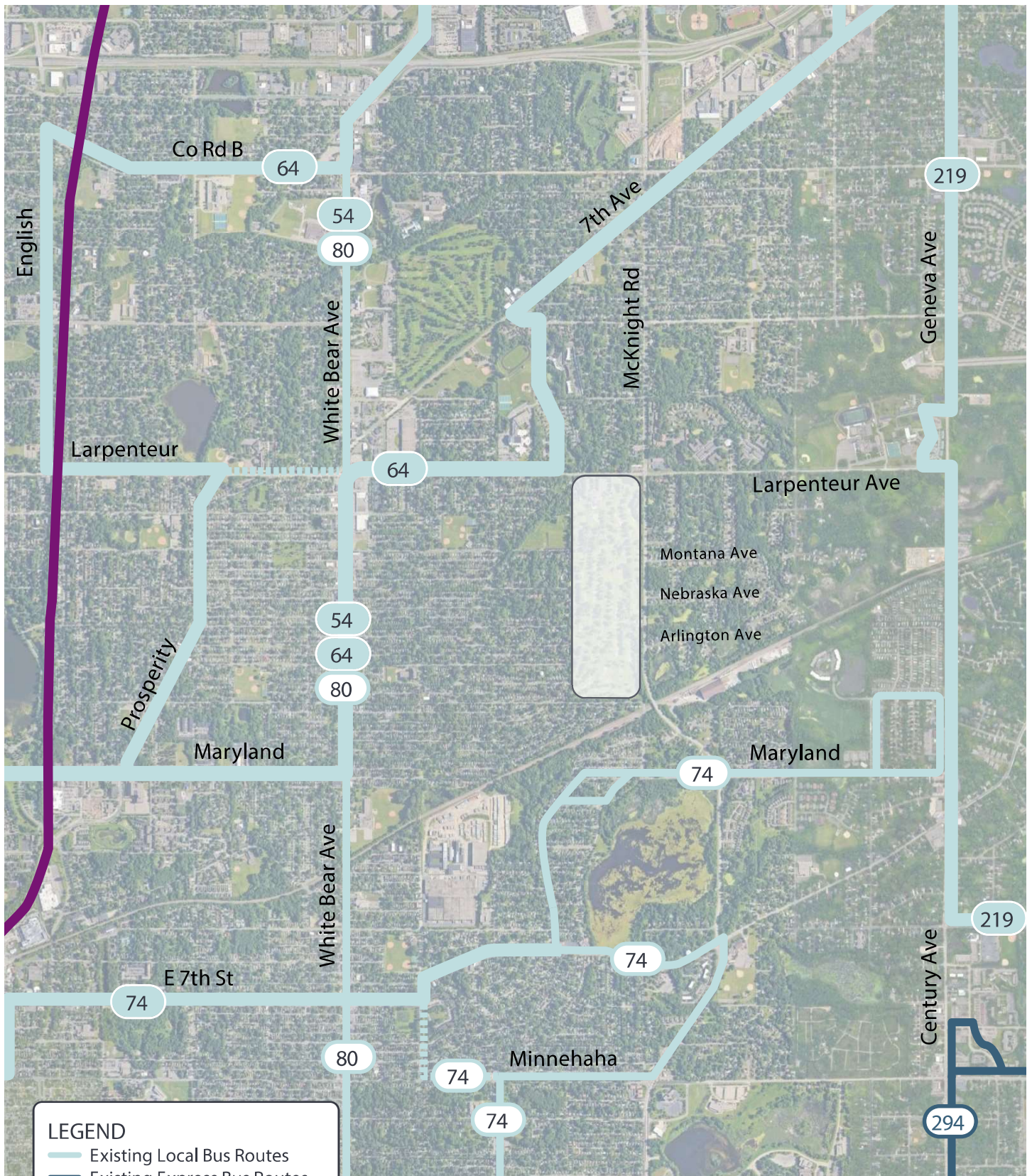
B. Turning Movement Counts

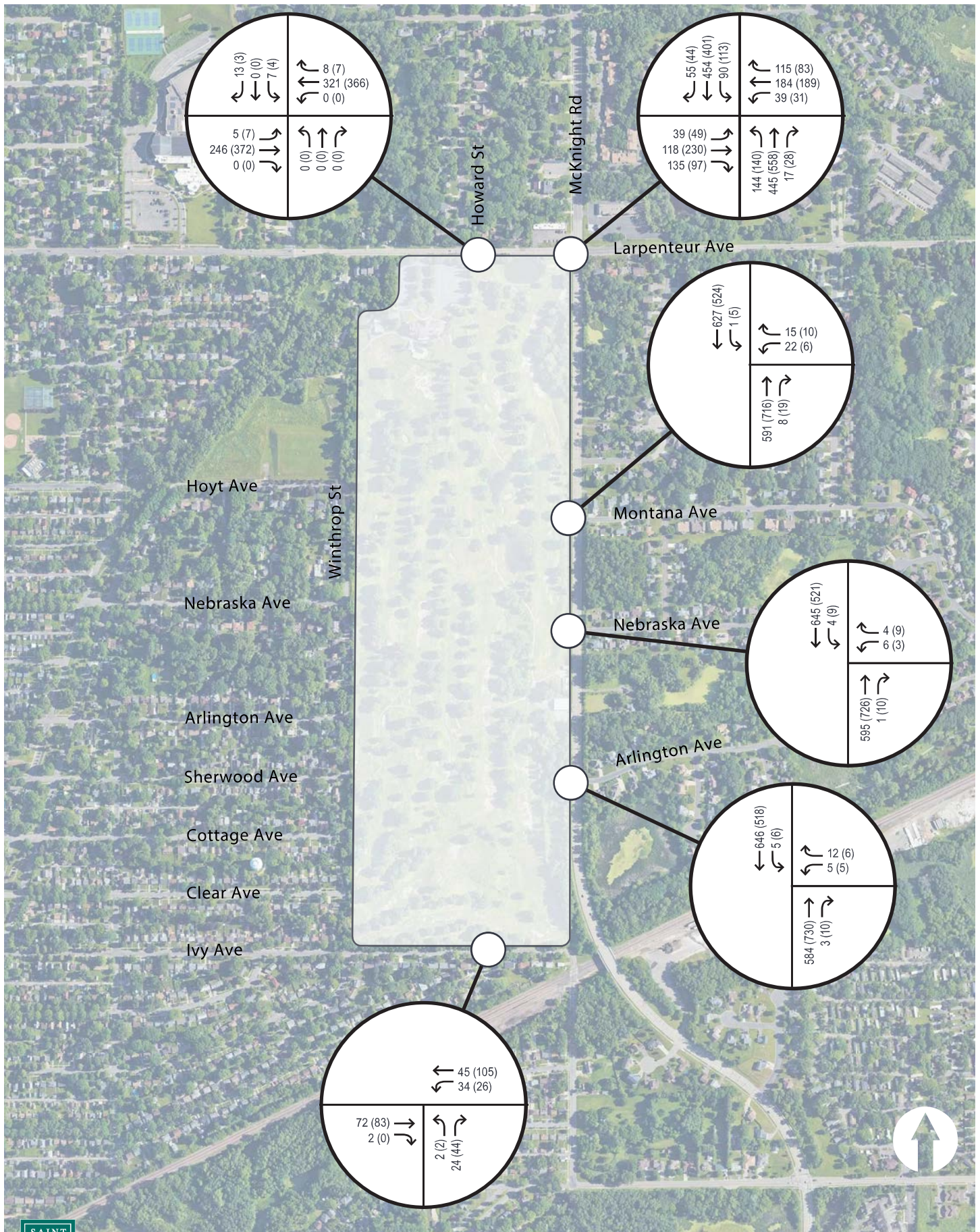
C. SimTraffic Analysis Results

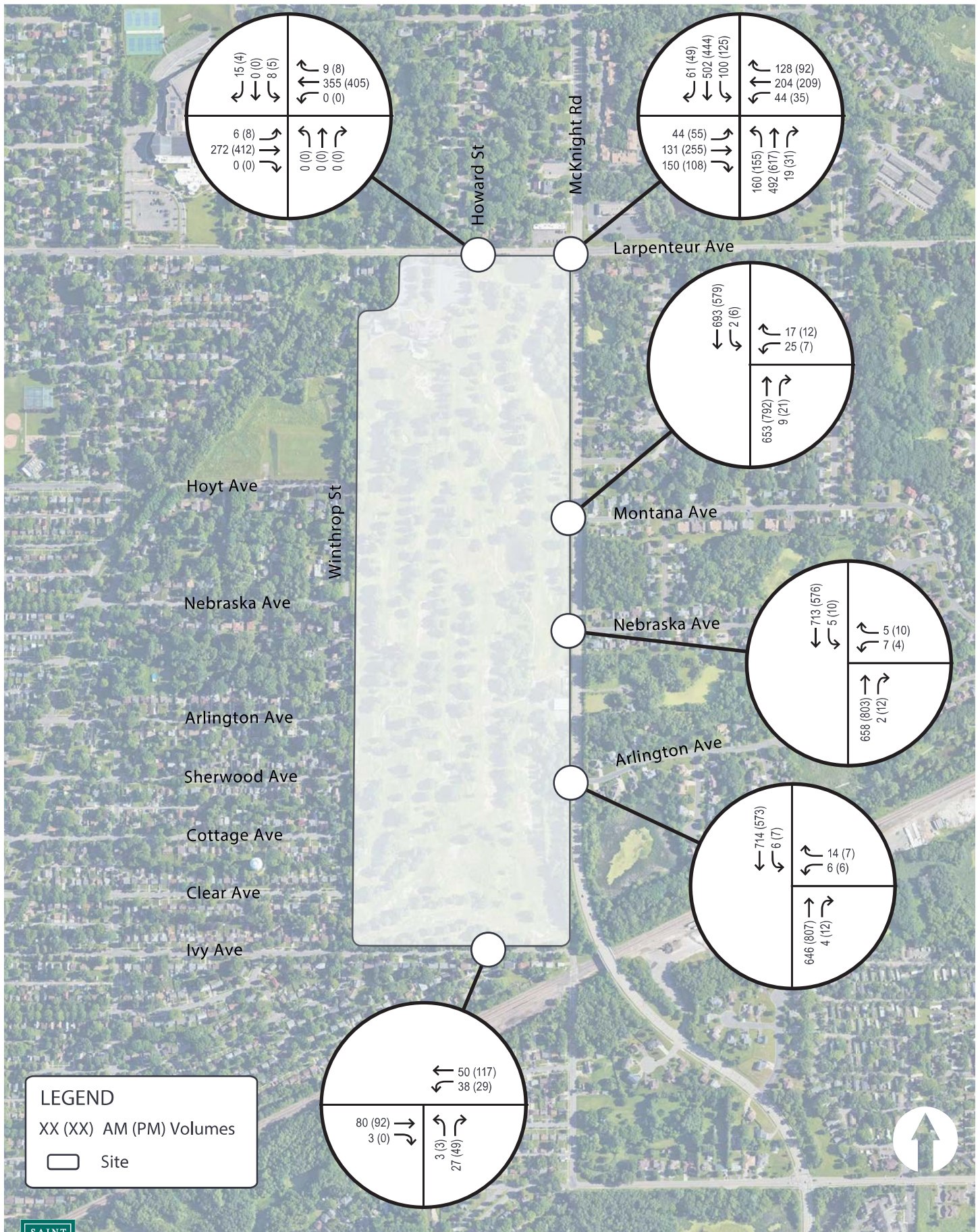
EXHIBITS

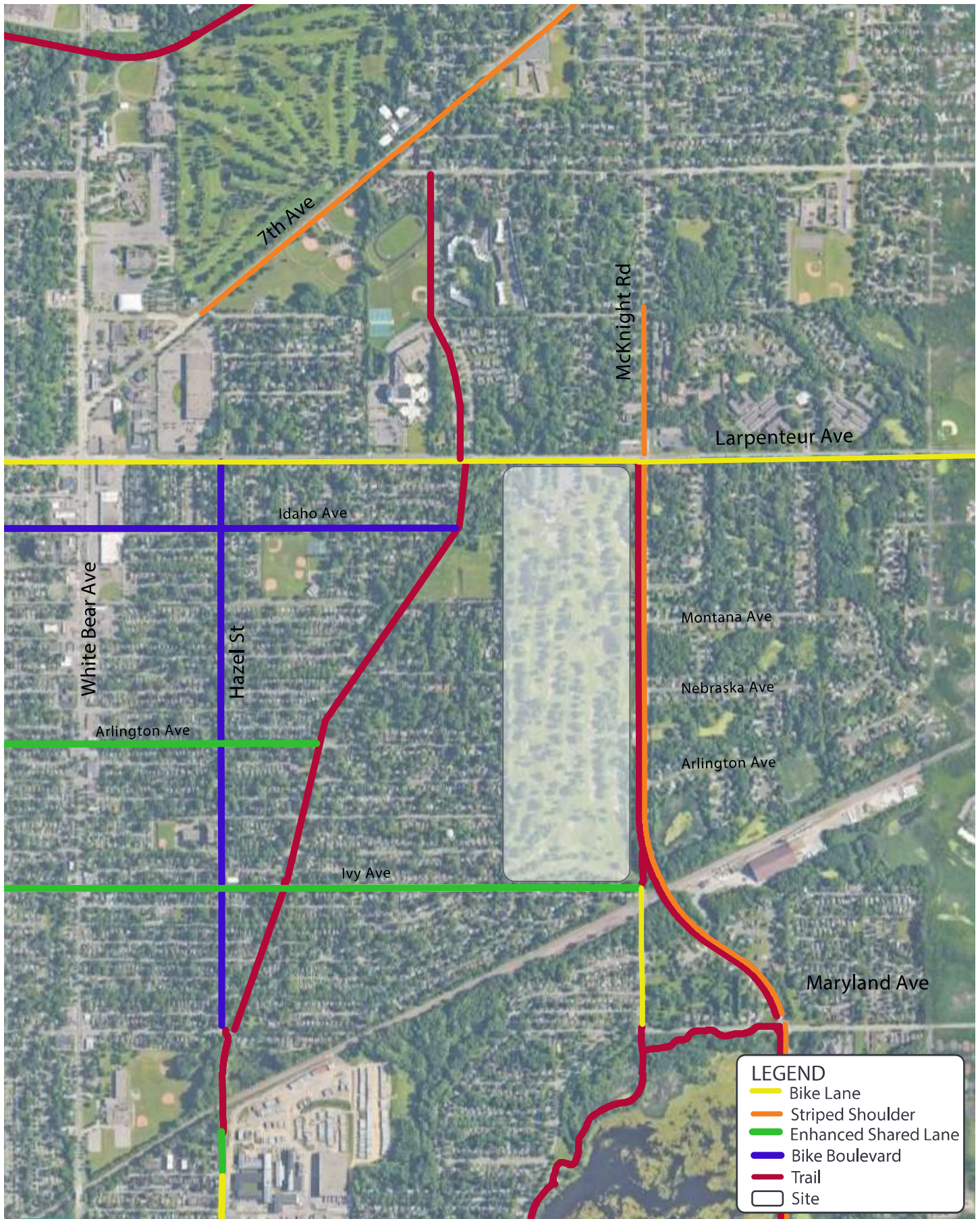


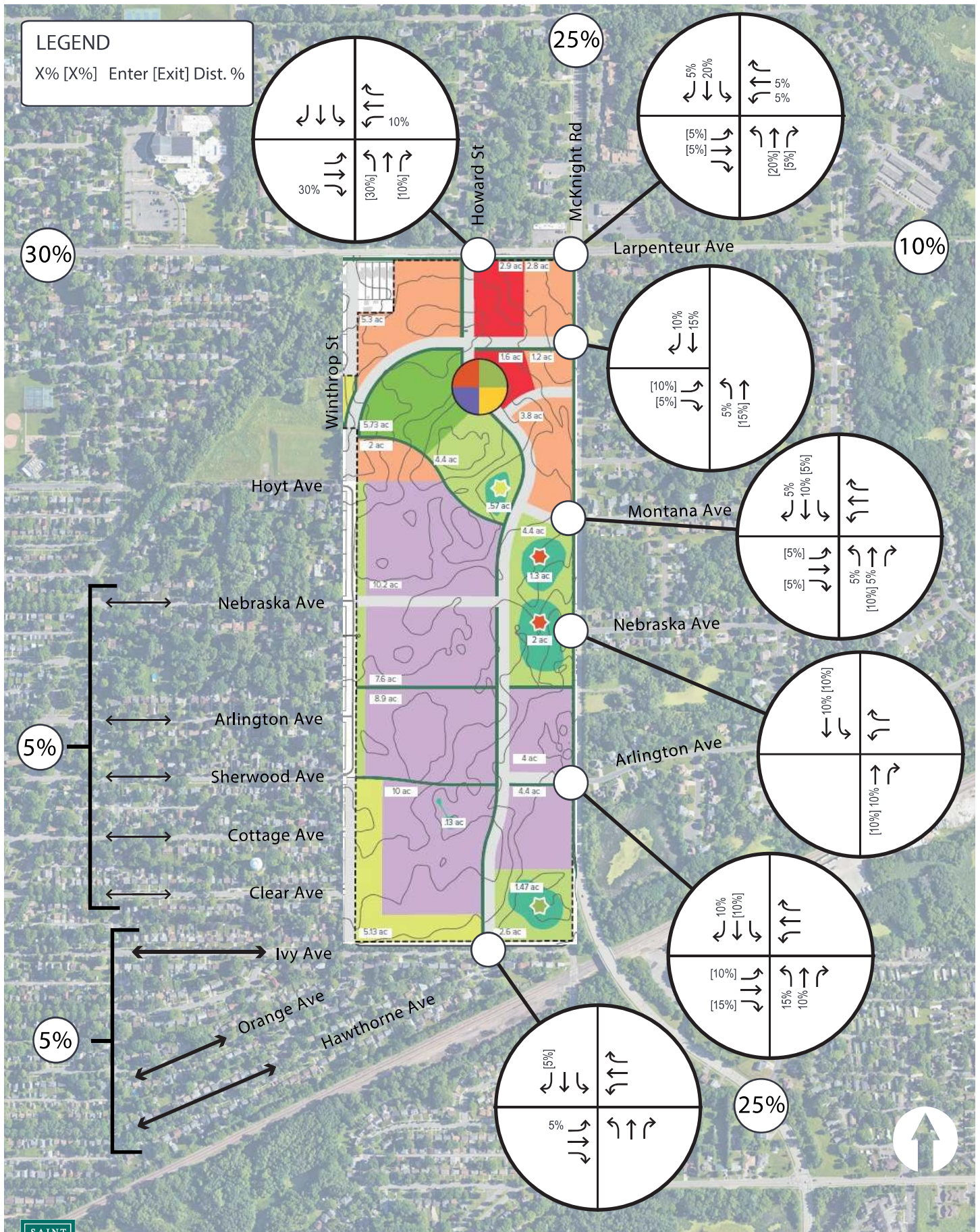


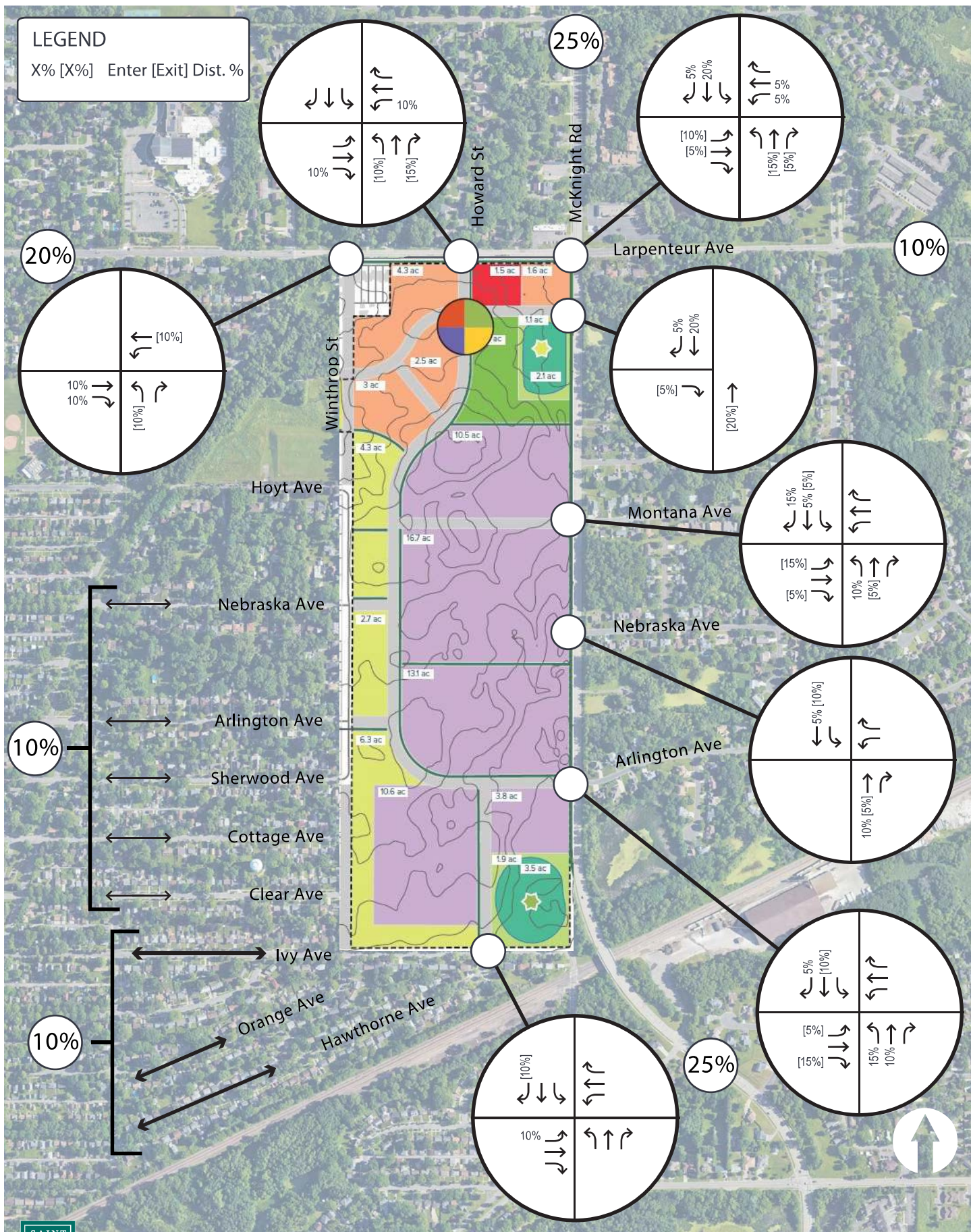


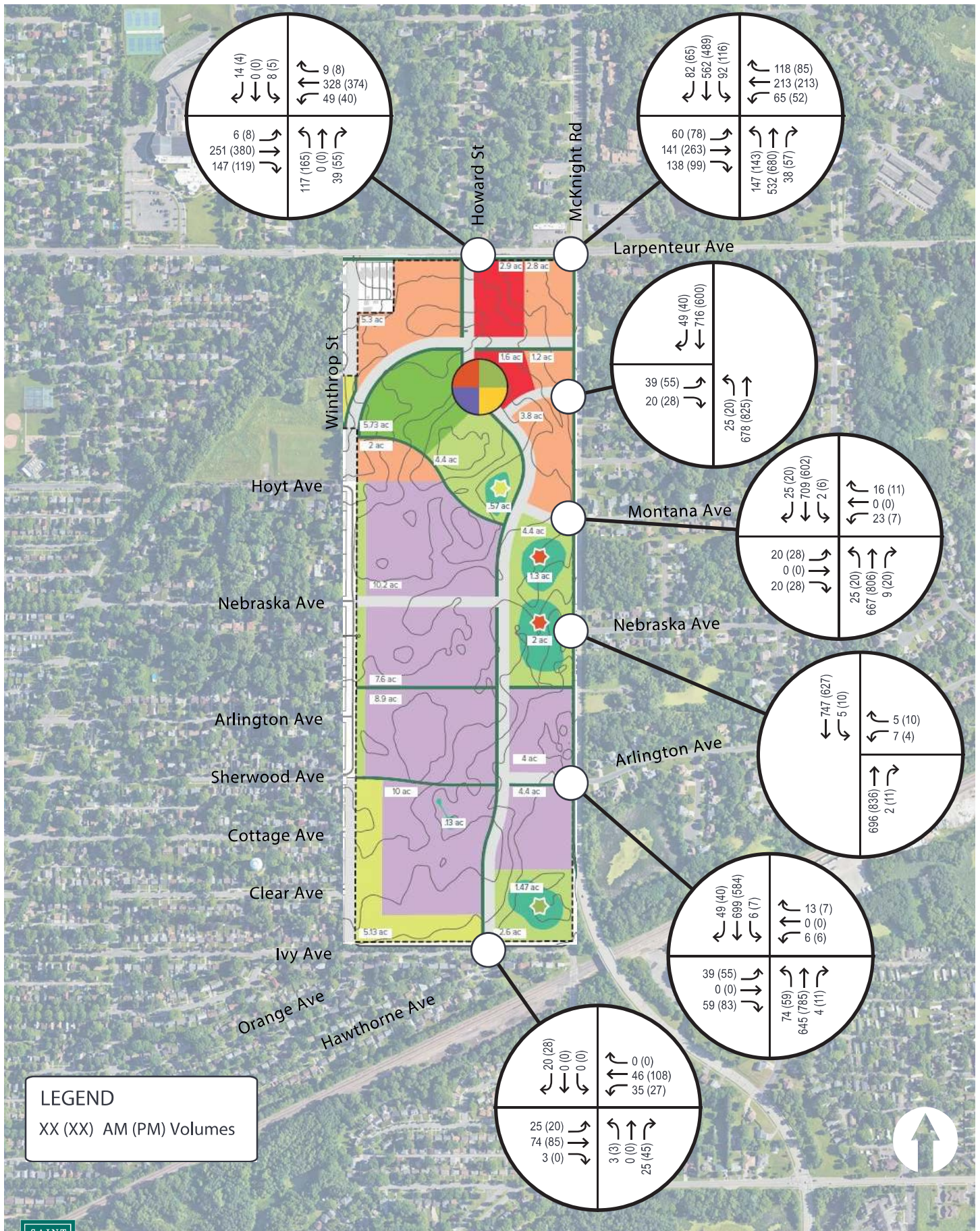












LEGEND

*XXX 2040 No Build Daily Traffic (vpd)
 +XXX Increase in Daily Traffic (vpd) with Development
 XXX 2040 Build Daily Traffic (vpd)

13,300
 +2,600
 15,900

9,400
 +3,000
 12,400

8,000
 +1,000
 9,000

+500 vpd

+500 vpd

*400
 +100
 500

*400
 +100
 500

*400
 +100
 500

*400
 +100
 500

*400
 +100
 500

Nebraska Ave

Arlington Ave

Sherwood Ave

Cottage Ave

Clear Ave

1,550
 +300
 1,850

Ivy Ave

*700
 +100
 800

*700
 +100
 800

Orange Ave

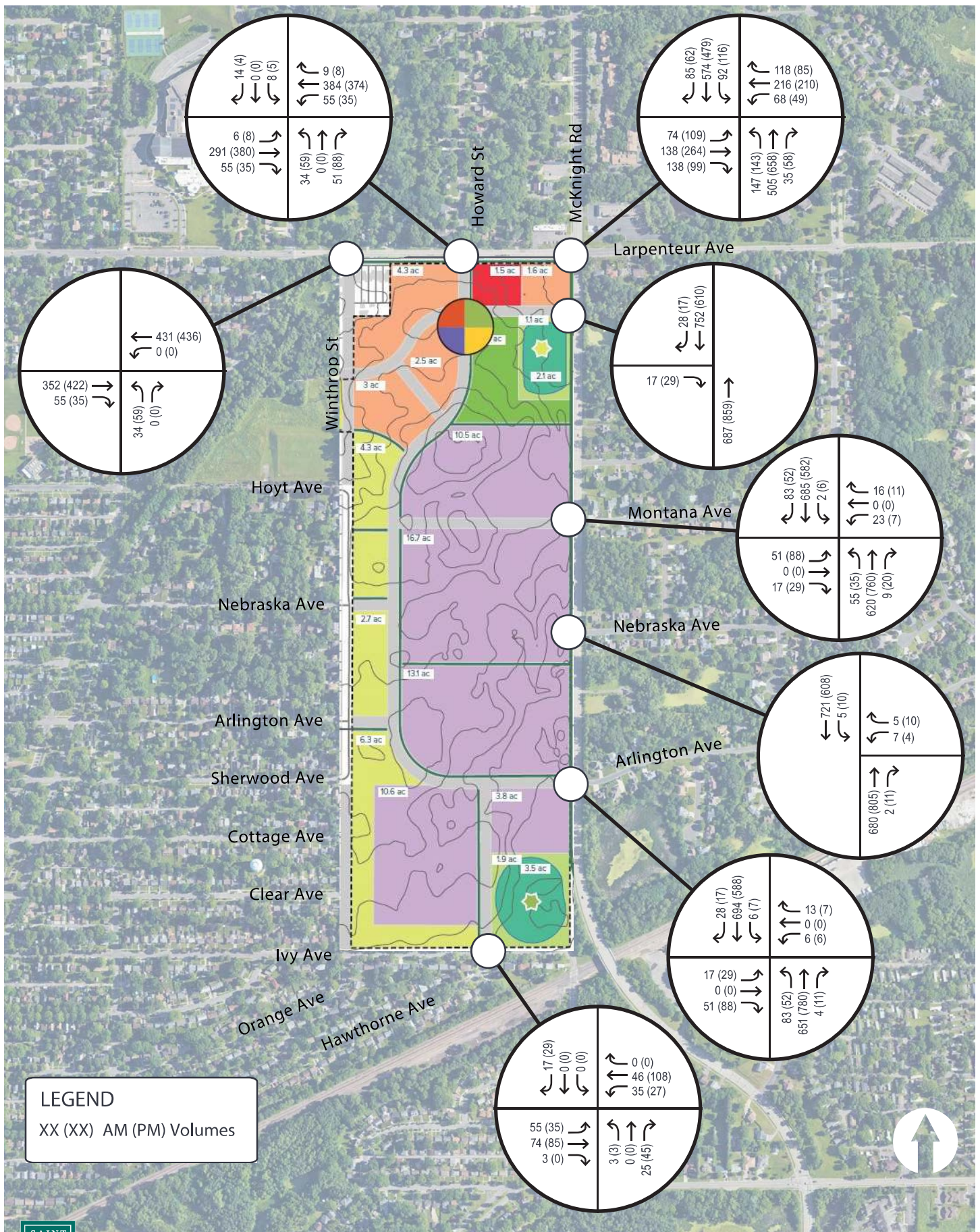
Hawthorne Ave

2,150
 +100
 2,250

13,300
 +2,500
 15,800

* Estimated Existing AADT





LEGEND

XXX 2040 No Build Daily Traffic (vpd)

+XXX Increase in Daily Traffic (vpd) with Development

XXX 2040 Build Daily Traffic (vpd)

13,300
+2,400
15,700

9,400
+1,900
11,300

8,000
+1,000
9,000

+1,000 vpd

+1,000 vpd

*400
+200
600

Nebraska Ave

*400
+200
600

Arlington Ave

*400
+200
600

Sherwood Ave

*400
+200
600

Cottage Ave

*400
+200
600

Clear Ave

1,550
+600
2,150

Ivy Ave

*700
+200
900

Orange Ave

*700
+200
900

Hawthorne Ave

*2,150
+100
2,250

13,300
+2,300
15,600

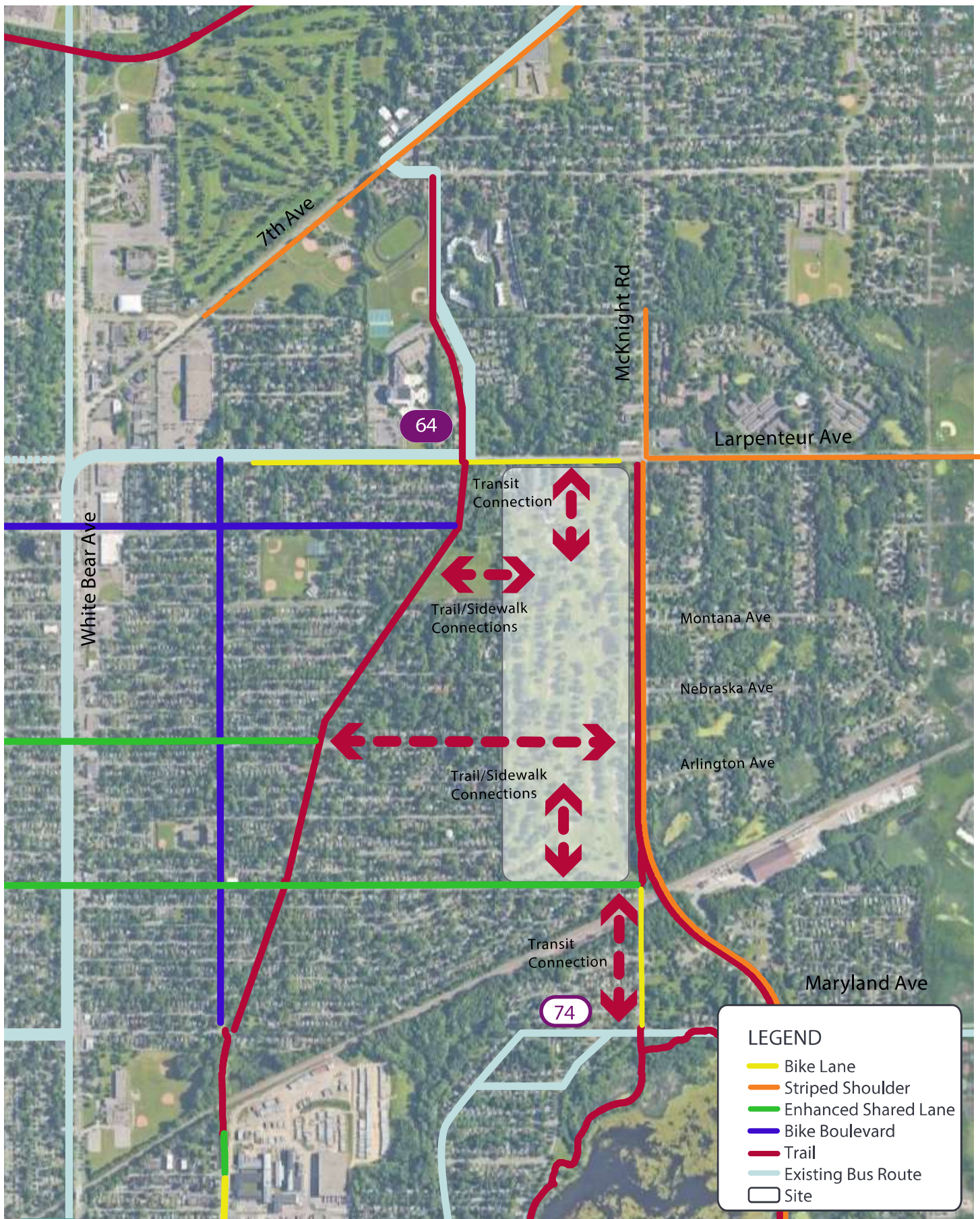
* Estimated Existing AADT



Kimley»Horn

EXHIBIT 12: 2040 Build Approach 2 Average Daily Traffic Increases

May 2021

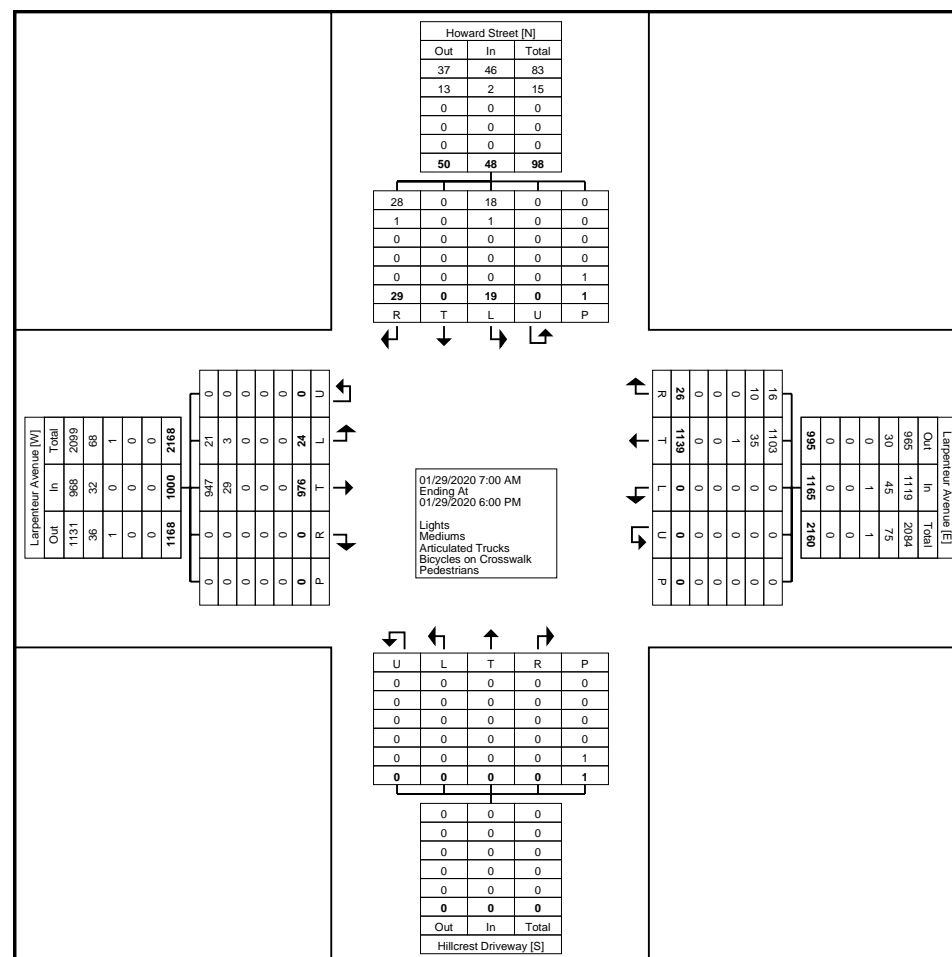


TURNING MOVEMENT COUNTS

Turning Movement Data

Start Time	Larpenteur Avenue Westbound						Larpenteur Avenue Eastbound						Howard Street Southbound						Hillcrest Driveway Northbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	56	1	0	0	57	2	31	0	0	0	33	1	0	4	0	0	5	0	0	0	0	0	0	95
7:15 AM	0	59	2	0	0	61	0	45	0	0	0	45	1	0	5	0	0	6	0	0	0	0	0	0	112
7:30 AM	0	104	1	0	0	105	2	81	0	0	0	83	1	0	3	0	0	4	0	0	0	0	0	0	192
7:45 AM	0	107	2	0	0	109	1	72	0	0	0	73	3	0	3	0	0	6	0	0	0	0	0	0	188
Hourly Total	0	326	6	0	0	332	5	229	0	0	0	234	6	0	15	0	0	21	0	0	0	0	0	0	587
8:00 AM	0	51	3	0	0	54	2	48	0	0	0	50	2	0	2	0	0	4	0	0	0	0	0	0	108
8:15 AM	0	56	0	0	0	56	1	42	0	0	0	43	2	0	2	0	0	4	0	0	0	0	0	0	103
8:30 AM	0	43	1	0	0	44	1	43	0	0	0	44	1	0	1	0	0	2	0	0	0	0	0	0	90
8:45 AM	0	52	0	0	0	52	2	34	0	0	0	36	1	0	0	0	0	1	0	0	0	0	0	0	89
Hourly Total	0	202	4	0	0	206	6	167	0	0	0	173	6	0	5	0	0	11	0	0	0	0	0	0	390
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	70	3	0	0	73	2	49	0	0	0	51	0	0	3	0	0	3	0	0	0	0	0	0	127
4:15 PM	0	74	3	0	0	77	3	82	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0	162
4:30 PM	0	80	0	0	0	80	1	79	0	0	0	80	1	0	2	0	0	3	0	0	0	0	0	0	163
4:45 PM	0	93	3	0	0	96	3	89	0	0	0	92	1	0	0	0	0	1	0	0	0	0	0	0	189
Hourly Total	0	317	9	0	0	326	9	299	0	0	0	308	2	0	5	0	0	7	0	0	0	0	0	0	641
5:00 PM	0	71	2	0	0	73	2	74	0	0	0	76	1	0	0	0	0	1	0	0	0	0	0	0	150
5:15 PM	0	87	2	0	0	89	1	83	0	0	0	84	1	0	1	0	1	2	0	0	0	0	0	0	175
5:30 PM	0	64	2	0	0	66	1	60	0	0	0	61	1	0	3	0	0	4	0	0	0	0	1	0	131
5:45 PM	0	72	1	0	0	73	0	64	0	0	0	64	2	0	0	0	0	2	0	0	0	0	0	0	139
Hourly Total	0	294	7	0	0	301	4	281	0	0	0	285	5	0	4	0	1	9	0	0	0	0	1	0	595
Grand Total	0	1139	26	0	0	1165	24	976	0	0	0	1000	19	0	29	0	1	48	0	0	0	0	1	0	2213
Approach %	0.0	97.8	2.2	0.0	-	-	2.4	97.6	0.0	0.0	-	-	39.6	0.0	60.4	0.0	-	-	0.0	0.0	0.0	0.0	-	-	-
Total %	0.0	51.5	1.2	0.0	-	52.6	1.1	44.1	0.0	0.0	-	45.2	0.9	0.0	1.3	0.0	-	2.2	0.0	0.0	0.0	0.0	-	0.0	-
Lights	0	1103	16	0	-	1119	21	947	0	0	-	968	18	0	28	0	-	46	0	0	0	0	-	0	2133
% Lights	-	96.8	61.5	-	-	96.1	87.5	97.0	-	-	-	96.8	94.7	-	96.6	-	-	95.8	-	-	-	-	-	-	96.4
Mediums	0	35	10	0	-	45	3	29	0	0	-	32	1	0	1	0	-	2	0	0	0	0	-	0	79
% Mediums	-	3.1	38.5	-	-	3.9	12.5	3.0	-	-	-	3.2	5.3	-	3.4	-	-	4.2	-	-	-	-	-	-	3.6
Articulated Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	-	0.1	0.0	-	-	0.1	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

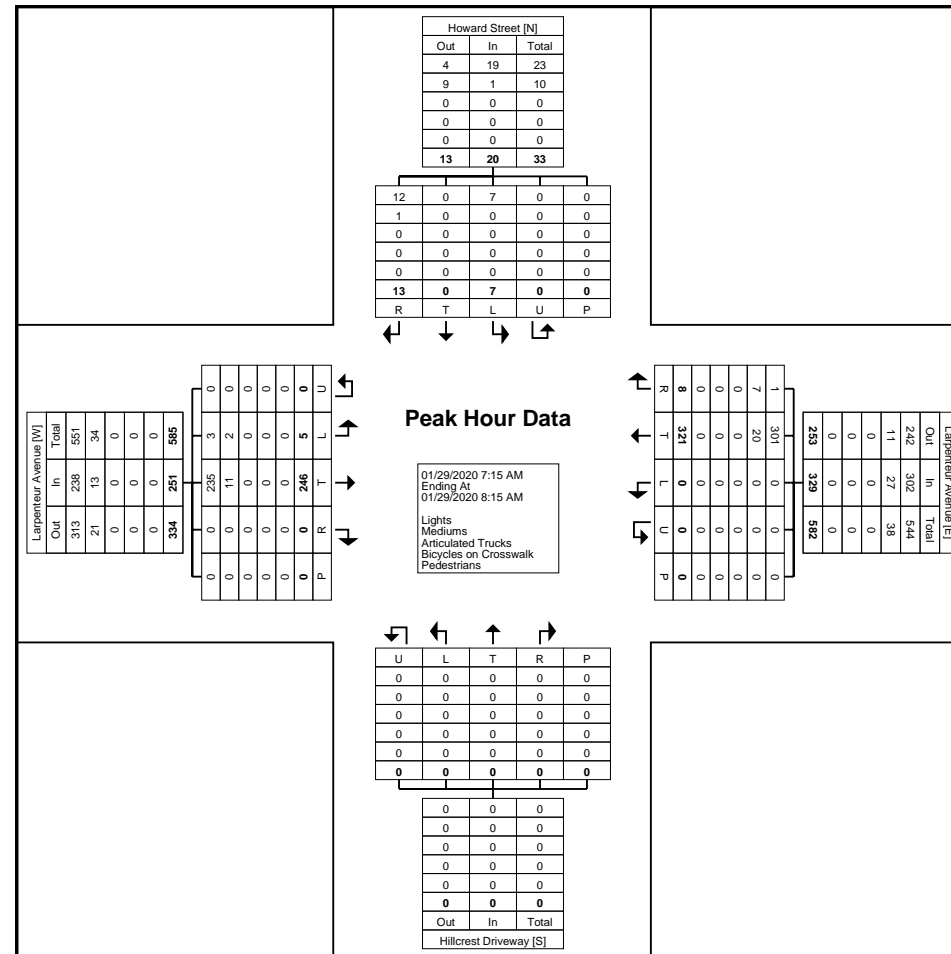
Count Name: Larpenteur Avenue & Howard
Street
Site Code:
Start Date: 01/29/2020
Page No: 2



Turning Movement Data Plot

Count Name: Larpenteur Avenue & Howard
Street
Site Code:
Start Date: 01/29/2020
Page No: 3

[illegible]



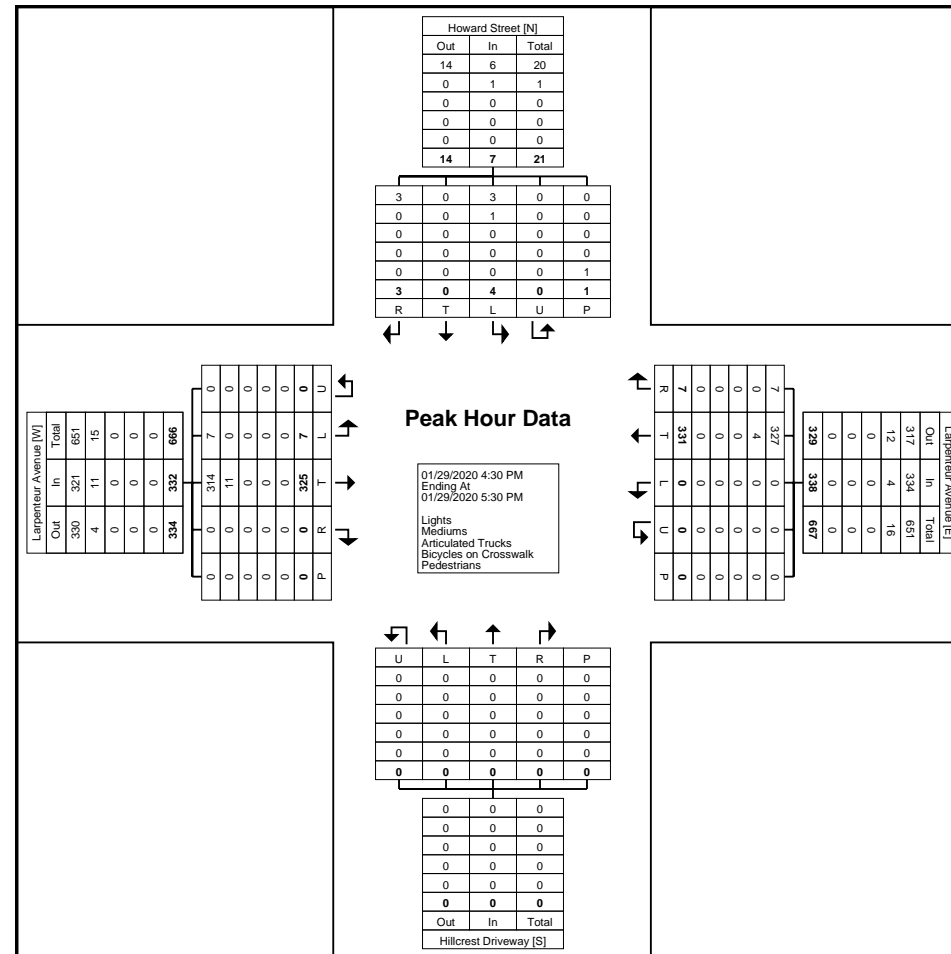
Turning Movement Peak Hour Data Plot (7:15 AM)

Kimley-Horn : Lisle (IL)
 1001 Warrenville Road, Suite 350
 Lisle, Illinois, United States 60532
 331.481.7332 jack.olsson@kimley-horn.com

Count Name: Larpenteur Avenue & Howard
 Street
 Site Code:
 Start Date: 01/29/2020
 Page No: 5

Turning Movement Peak Hour Data (4:30 PM)

Start Time	Larpenteur Avenue Westbound						Larpenteur Avenue Eastbound						Howard Street Southbound						Hillcrest Driveway Northbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	0	80	0	0	0	80	1	79	0	0	0	80	1	0	2	0	0	3	0	0	0	0	0	0	163
4:45 PM	0	93	3	0	0	96	3	89	0	0	0	92	1	0	0	0	0	1	0	0	0	0	0	0	189
5:00 PM	0	71	2	0	0	73	2	74	0	0	0	76	1	0	0	0	0	1	0	0	0	0	0	0	150
5:15 PM	0	87	2	0	0	89	1	83	0	0	0	84	1	0	1	0	1	2	0	0	0	0	0	0	175
Total	0	331	7	0	0	338	7	325	0	0	0	332	4	0	3	0	1	7	0	0	0	0	0	0	677
Approach %	0.0	97.9	2.1	0.0	-	-	2.1	97.9	0.0	0.0	-	-	57.1	0.0	42.9	0.0	-	-	0.0	0.0	0.0	0.0	-	-	-
Total %	0.0	48.9	1.0	0.0	-	49.9	1.0	48.0	0.0	0.0	-	49.0	0.6	0.0	0.4	0.0	-	1.0	0.0	0.0	0.0	0.0	-	0.0	-
PHF	0.000	0.890	0.583	0.000	-	0.880	0.583	0.913	0.000	0.000	-	0.902	1.000	0.000	0.375	0.000	-	0.583	0.000	0.000	0.000	0.000	-	0.000	0.896
Lights	0	327	7	0	-	334	7	314	0	0	-	321	3	0	3	0	-	6	0	0	0	0	-	0	661
% Lights	-	98.8	100.0	-	-	98.8	100.0	96.6	-	-	-	96.7	75.0	-	100.0	-	-	85.7	-	-	-	-	-	-	97.6
Mediums	0	4	0	0	-	4	0	11	0	0	-	11	1	0	0	0	-	1	0	0	0	0	-	0	16
% Mediums	-	1.2	0.0	-	-	1.2	0.0	3.4	-	-	-	3.3	25.0	-	0.0	-	-	14.3	-	-	-	-	-	-	2.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-



Turning Movement Peak Hour Data Plot (4:30 PM)

Ramsey County Public Works

1425 Paul Kirkwold Drive
Arden Hills, MN 55112

TMC - Larpenteur Avenue at McKnight Road

File Name : 6am-10am
Site Code :
Start Date : 5/16/2018
Page No : 1

Groups Printed- Cars +

	McKnight Road From North					Larpenteur Ave From East					McKnight Road From South					Larpenteur Ave From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	3	40	2	0	45	8	17	5	0	30	2	43	7	0	52	6	10	3	0	19	146
06:15 AM	3	41	5	0	49	10	14	6	0	30	3	49	11	0	63	12	9	3	0	24	166
06:30 AM	6	57	3	0	66	17	22	5	0	44	5	63	18	0	86	8	14	6	0	28	224
06:45 AM	3	66	15	0	84	25	34	7	0	66	5	53	15	0	73	12	9	6	0	27	250
Total	15	204	25	0	244	60	87	23	0	170	15	208	51	0	274	38	42	18	0	98	786
07:00 AM	6	71	17	0	94	25	25	10	0	60	2	72	21	0	95	26	22	3	0	51	300
07:15 AM	15	87	24	0	126	24	33	13	0	70	2	73	35	0	110	31	21	8	0	60	366
07:30 AM	17	90	38	0	145	29	48	7	0	84	10	79	42	0	131	22	32	10	0	64	424
07:45 AM	13	61	15	0	89	44	64	15	0	123	4	61	49	0	114	44	40	12	0	96	422
Total	51	309	94	0	454	122	170	45	0	337	18	285	147	0	450	123	115	33	0	271	1512
08:00 AM	10	76	13	0	99	18	39	4	0	61	1	62	18	0	81	38	25	9	0	72	313
08:15 AM	9	85	20	0	114	16	28	6	0	50	3	77	16	0	96	14	30	9	0	53	313
08:30 AM	4	70	8	0	82	18	25	5	0	48	3	74	28	0	105	16	28	9	0	53	288
08:45 AM	9	80	5	0	94	13	34	6	0	53	3	69	19	0	91	17	17	6	0	40	278
Total	32	311	46	0	389	65	126	21	0	212	10	282	81	0	373	85	100	33	0	218	1192
09:00 AM	4	47	4	0	55	17	40	3	0	60	1	62	13	0	76	17	17	6	0	40	231
09:15 AM	7	50	6	0	63	6	21	2	0	29	2	57	11	0	70	22	19	3	0	44	206
09:30 AM	8	46	9	0	63	15	21	5	0	41	5	70	14	0	89	16	28	3	0	47	240
09:45 AM	6	47	9	0	62	7	26	8	0	41	7	56	13	0	76	8	21	5	0	34	213
Total	25	190	28	0	243	45	108	18	0	171	15	245	51	0	311	63	85	17	0	165	890
Grand Total	123	1014	193	0	1330	292	491	107	0	890	58	1020	330	0	1408	309	342	101	0	752	4380
Apprch %	9.2	76.2	14.5	0		32.8	55.2	12	0		4.1	72.4	23.4	0		41.1	45.5	13.4	0		
Total %	2.8	23.2	4.4	0	30.4	6.7	11.2	2.4	0	20.3	1.3	23.3	7.5	0	32.1	7.1	7.8	2.3	0	17.2	

Ramsey County Public Works

1425 Paul Kirkwold Drive
Arden Hills, MN 55112

TMC - Larpenteur Avenue at McKnight Road

File Name : 2pm-6pm

Site Code :

Start Date : 5/16/2018

Page No : 1

Groups Printed- Cars +

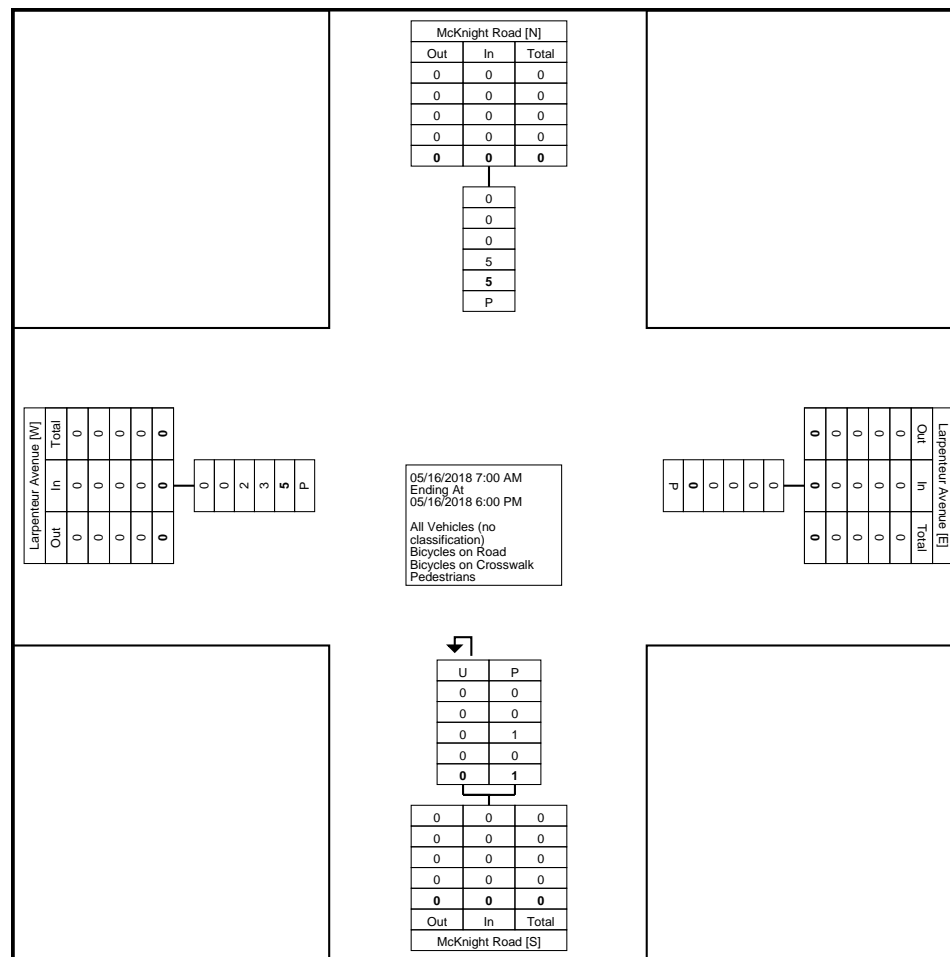
	McKnight Road From North					Larpenteur Avenue From East					McKnight Road From South					Larpenteur Avenue From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	8	75	14	0	97	13	20	8	0	41	3	78	16	0	97	18	32	8	0	58	293
02:15 PM	11	69	23	0	103	15	36	2	0	53	10	82	9	0	101	34	38	7	0	79	336
02:30 PM	8	75	15	0	98	43	44	22	0	109	6	83	24	0	113	23	32	8	0	63	383
02:45 PM	12	75	18	0	105	25	53	6	0	84	7	75	38	0	120	15	36	5	0	56	365
Total	39	294	70	0	403	96	153	38	0	287	26	318	87	0	431	90	138	28	0	256	1377
03:00 PM	12	82	28	0	122	20	35	11	0	66	12	67	33	0	112	57	59	10	0	126	426
03:15 PM	17	82	28	0	127	12	44	12	0	68	4	76	24	0	104	32	52	12	0	96	395
03:30 PM	16	87	8	0	111	23	33	16	0	72	10	117	31	0	158	26	49	5	0	80	421
03:45 PM	10	84	25	0	119	18	36	7	0	61	4	87	20	0	111	25	32	10	0	67	358
Total	55	335	89	0	479	73	148	46	0	267	30	347	108	0	485	140	192	37	0	369	1600
04:00 PM	15	83	24	0	122	22	58	9	0	89	7	106	28	0	141	31	54	11	0	96	448
04:15 PM	14	94	27	0	135	19	31	6	0	56	7	113	33	0	153	36	55	10	0	101	445
04:30 PM	12	106	28	0	146	23	59	3	0	85	3	128	25	0	156	35	52	16	0	103	490
04:45 PM	13	64	30	0	107	18	41	8	0	67	7	134	38	0	179	39	67	16	0	122	475
Total	54	347	109	0	510	82	189	26	0	297	24	481	124	0	629	141	228	53	0	422	1858
05:00 PM	11	115	33	0	159	21	43	6	0	70	3	101	23	0	127	37	53	5	0	95	451
05:15 PM	8	116	22	0	146	21	46	14	0	81	10	104	31	0	145	43	58	12	0	113	485
05:30 PM	11	95	34	0	140	20	39	6	0	65	10	78	23	0	111	34	46	12	0	92	408
05:45 PM	6	112	27	0	145	16	44	14	0	74	12	93	28	0	133	23	46	10	0	79	431
Total	36	438	116	0	590	78	172	40	0	290	35	376	105	0	516	137	203	39	0	379	1775
Grand Total	184	1414	384	0	1982	329	662	150	0	1141	115	1522	424	0	2061	508	761	157	0	1426	6610
Apprch %	9.3	71.3	19.4	0		28.8	58	13.1	0		5.6	73.8	20.6	0		35.6	53.4	11	0		
Total %	2.8	21.4	5.8	0	30	5	10	2.3	0	17.3	1.7	23	6.4	0	31.2	7.7	11.5	2.4	0	21.6	

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350
Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: McKnight Road & Larpenteur
Avenue
Site Code:
Start Date: 05/16/2018
Page No: 1

Turning Movement Data

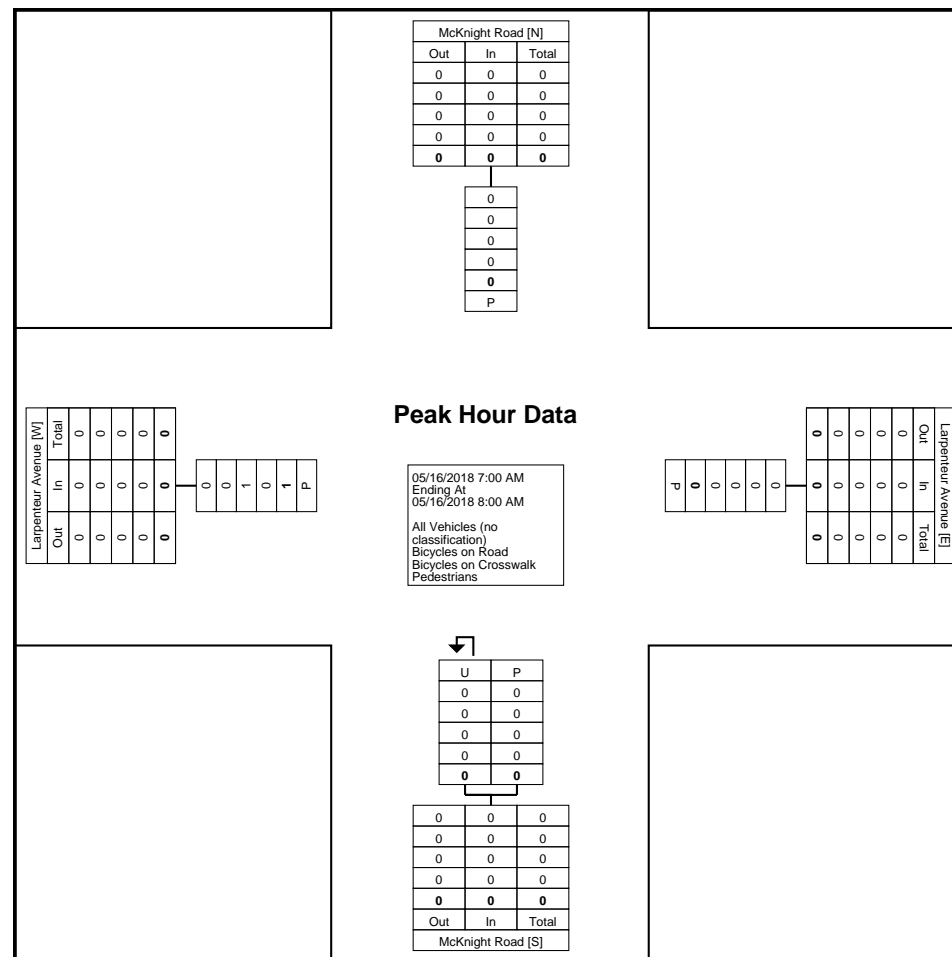
Start Time	Larpenteur Avenue Westbound		Larpenteur Avenue Eastbound		McKnight Road Southbound		McKnight Road Northbound			Int. Total
	Peds	App. Total	Peds	App. Total	Peds	App. Total	U-Turn	Peds	App. Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	1	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	0	0	0	0	0	0	1	0	0
4:15 PM	0	0	0	0	1	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	0	0	0	0
Hourly Total	0	0	1	0	1	0	0	1	0	0
5:00 PM	0	0	1	0	2	0	0	0	0	0
5:15 PM	0	0	1	0	1	0	0	0	0	0
5:30 PM	0	0	1	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	1	0	0	0	0	0
Hourly Total	0	0	3	0	4	0	0	0	0	0
Grand Total	0	0	5	0	5	0	0	1	0	0
Approach %	-	-	-	-	-	-	0.0	-	-	-
Total %	-	0.0	-	0.0	-	0.0	0.0	-	0.0	-
All Vehicles (no classification)	-	0	-	0	-	0	0	-	0	0
% All Vehicles (no classification)	-	-	-	-	-	-	-	-	-	-
Bicycles on Road	-	0	-	0	-	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	0	-	2	-	0	-	-	1	-	-
% Bicycles on Crosswalk	-	-	40.0	-	0.0	-	-	100.0	-	-
Pedestrians	0	-	3	-	5	-	-	0	-	-
% Pedestrians	-	-	60.0	-	100.0	-	-	0.0	-	-



Turning Movement Data Plot

Turning Movement Peak Hour Data (7:00 AM)

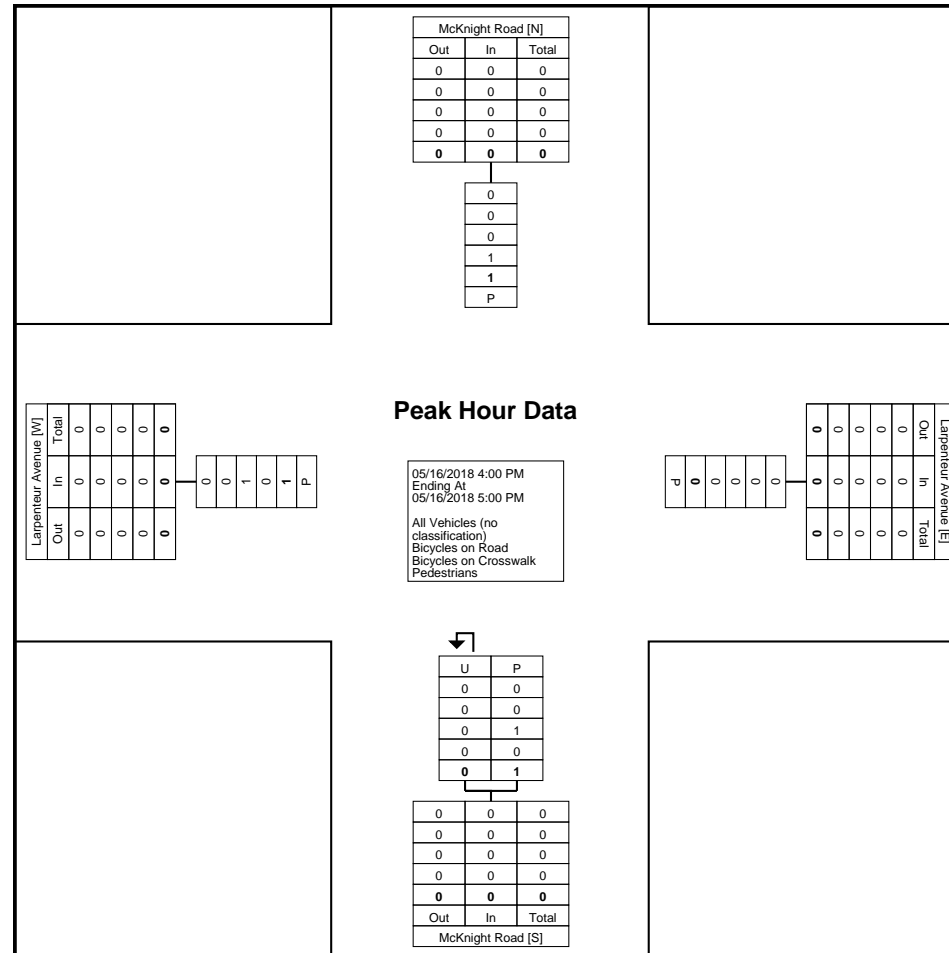
Start Time	Larpenteur Avenue Westbound		Larpenteur Avenue Eastbound		McKnight Road Southbound		McKnight Road Northbound			Int. Total
	Peds	App. Total	Peds	App. Total	Peds	App. Total	U-Turn	Peds	App. Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	0	0	0
Approach %	-	-	-	-	-	-	0.0	-	-	-
Total %	-	0.0	-	0.0	-	0.0	0.0	-	0.0	-
PHF	-	0.000	-	0.000	-	0.000	0.000	-	0.000	0.000
All Vehicles (no classification)	-	0	-	0	-	0	0	-	0	0
% All Vehicles (no classification)	-	-	-	-	-	-	-	-	-	-
Bicycles on Road	-	0	-	0	-	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	0	-	1	-	0	-	-	0	-	-
% Bicycles on Crosswalk	-	-	100.0	-	-	-	-	-	-	-
Pedestrians	0	-	0	-	0	-	-	0	-	-
% Pedestrians	-	-	0.0	-	-	-	-	-	-	-



Turning Movement Peak Hour Data Plot (7:00 AM)

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Larpenteur Avenue Westbound		Larpenteur Avenue Eastbound		McKnight Road Southbound		McKnight Road Northbound			Int. Total
	Peds	App. Total	Peds	App. Total	Peds	App. Total	U-Turn	Peds	App. Total	
4:00 PM	0	0	0	0	0	0	0	1	0	0
4:15 PM	0	0	0	0	1	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	0	0	0	0
Total	0	0	1	0	1	0	0	1	0	0
Approach %	-	-	-	-	-	-	0.0	-	-	-
Total %	-	0.0	-	0.0	-	0.0	0.0	-	0.0	-
PHF	-	0.000	-	0.000	-	0.000	0.000	-	0.000	0.000
All Vehicles (no classification)	-	0	-	0	-	0	0	-	0	0
% All Vehicles (no classification)	-	-	-	-	-	-	-	-	-	-
Bicycles on Road	-	0	-	0	-	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	0	-	1	-	0	-	-	1	-	-
% Bicycles on Crosswalk	-	-	100.0	-	0.0	-	-	100.0	-	-
Pedestrians	0	-	0	-	1	-	-	0	-	-
% Pedestrians	-	-	0.0	-	100.0	-	-	0.0	-	-



Turning Movement Peak Hour Data Plot (4:00 PM)

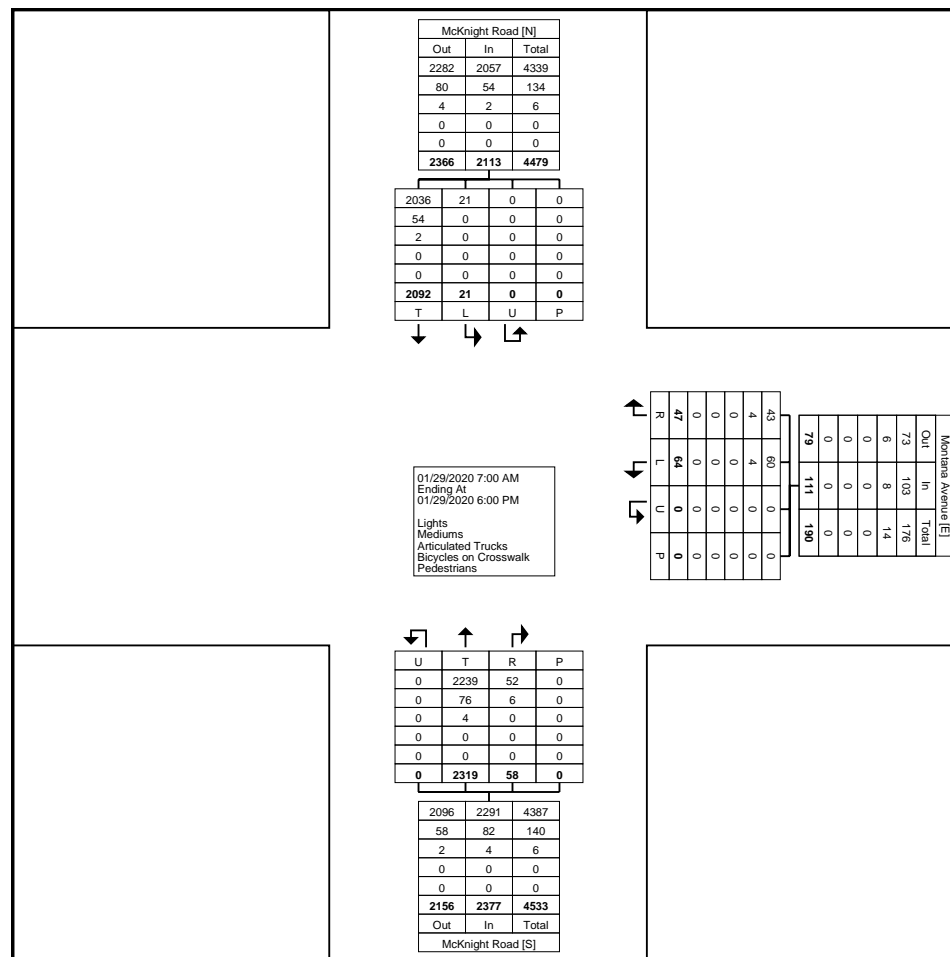
Count Name: McKnight Road & Montana Avenue
Site Code:
Start Date: 01/29/2020
Page No: 1

Turning Movement Data

Start Time	Montana Avenue Westbound					McKnight Road Southbound					McKnight Road Northbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	5	5	0	0	10	0	80	0	0	80	104	0	0	0	104	194
7:15 AM	4	1	0	0	5	0	118	0	0	118	165	3	0	0	168	291
7:30 AM	9	6	0	0	15	0	165	0	0	165	176	2	0	0	178	358
7:45 AM	4	6	0	0	10	1	204	0	0	205	140	1	0	0	141	356
Hourly Total	22	18	0	0	40	1	567	0	0	568	585	6	0	0	591	1199
8:00 AM	5	2	0	0	7	0	140	0	0	140	110	2	0	0	112	259
8:15 AM	9	3	0	0	12	2	125	0	0	127	98	1	0	0	99	238
8:30 AM	5	1	0	0	6	1	107	0	0	108	104	3	0	0	107	221
8:45 AM	4	4	0	0	8	1	120	0	0	121	97	6	0	0	103	232
Hourly Total	23	10	0	0	33	4	492	0	0	496	409	12	0	0	421	950
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	3	1	0	0	4	2	137	0	0	139	167	6	0	0	173	316
4:15 PM	5	3	0	0	8	4	144	0	0	148	171	2	0	0	173	329
4:30 PM	2	3	0	0	5	3	138	0	0	141	176	5	0	0	181	327
4:45 PM	0	4	0	0	4	0	123	0	0	123	193	6	0	0	199	326
Hourly Total	10	11	0	0	21	9	542	0	0	551	707	19	0	0	726	1298
5:00 PM	3	1	0	0	4	2	120	0	0	122	174	6	0	0	180	306
5:15 PM	1	2	0	0	3	0	143	0	0	143	173	2	0	0	175	321
5:30 PM	4	2	0	0	6	2	114	0	0	116	156	9	0	0	165	287
5:45 PM	1	3	0	0	4	3	114	0	0	117	115	4	0	0	119	240
Hourly Total	9	8	0	0	17	7	491	0	0	498	618	21	0	0	639	1154
Grand Total	64	47	0	0	111	21	2092	0	0	2113	2319	58	0	0	2377	4601
Approach %	57.7	42.3	0.0	-	-	1.0	99.0	0.0	-	-	97.6	2.4	0.0	-	-	-
Total %	1.4	1.0	0.0	-	2.4	0.5	45.5	0.0	-	45.9	50.4	1.3	0.0	-	51.7	-
Lights	60	43	0	-	103	21	2036	0	-	2057	2239	52	0	-	2291	4451
% Lights	93.8	91.5	-	-	92.8	100.0	97.3	-	-	97.3	96.6	89.7	-	-	96.4	96.7
Mediums	4	4	0	-	8	0	54	0	-	54	76	6	0	-	82	144
% Mediums	6.3	8.5	-	-	7.2	0.0	2.6	-	-	2.6	3.3	10.3	-	-	3.4	3.1
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	4	0	0	-	4	6
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.1	-	-	0.1	0.2	0.0	-	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350
Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: McKnight Road & Montana
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 2



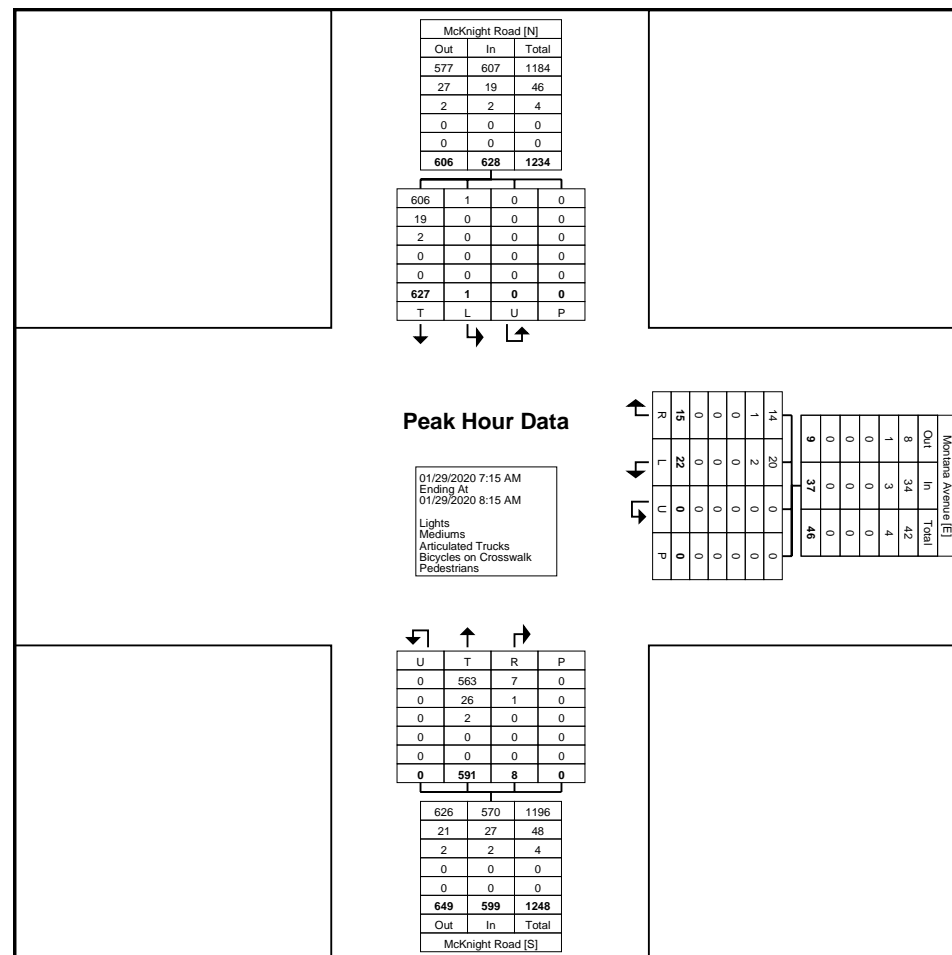
Turning Movement Data Plot

Count Name: McKnight Road & Montana Avenue
Site Code:
Start Date: 01/29/2020
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Montana Avenue Westbound					McKnight Road Southbound					McKnight Road Northbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
7:15 AM	4	1	0	0	5	0	118	0	0	118	165	3	0	0	168	291
7:30 AM	9	6	0	0	15	0	165	0	0	165	176	2	0	0	178	358
7:45 AM	4	6	0	0	10	1	204	0	0	205	140	1	0	0	141	356
8:00 AM	5	2	0	0	7	0	140	0	0	140	110	2	0	0	112	259
Total	22	15	0	0	37	1	627	0	0	628	591	8	0	0	599	1264
Approach %	59.5	40.5	0.0	-	-	0.2	99.8	0.0	-	-	98.7	1.3	0.0	-	-	-
Total %	1.7	1.2	0.0	-	2.9	0.1	49.6	0.0	-	49.7	46.8	0.6	0.0	-	47.4	-
PHF	0.611	0.625	0.000	-	0.617	0.250	0.768	0.000	-	0.766	0.839	0.667	0.000	-	0.841	0.883
Lights	20	14	0	-	34	1	606	0	-	607	563	7	0	-	570	1211
% Lights	90.9	93.3	-	-	91.9	100.0	96.7	-	-	96.7	95.3	87.5	-	-	95.2	95.8
Mediums	2	1	0	-	3	0	19	0	-	19	26	1	0	-	27	49
% Mediums	9.1	6.7	-	-	8.1	0.0	3.0	-	-	3.0	4.4	12.5	-	-	4.5	3.9
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	2	0	0	-	2	4
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.3	0.0	-	-	0.3	0.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Count Name: McKnight Road & Montana
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 4



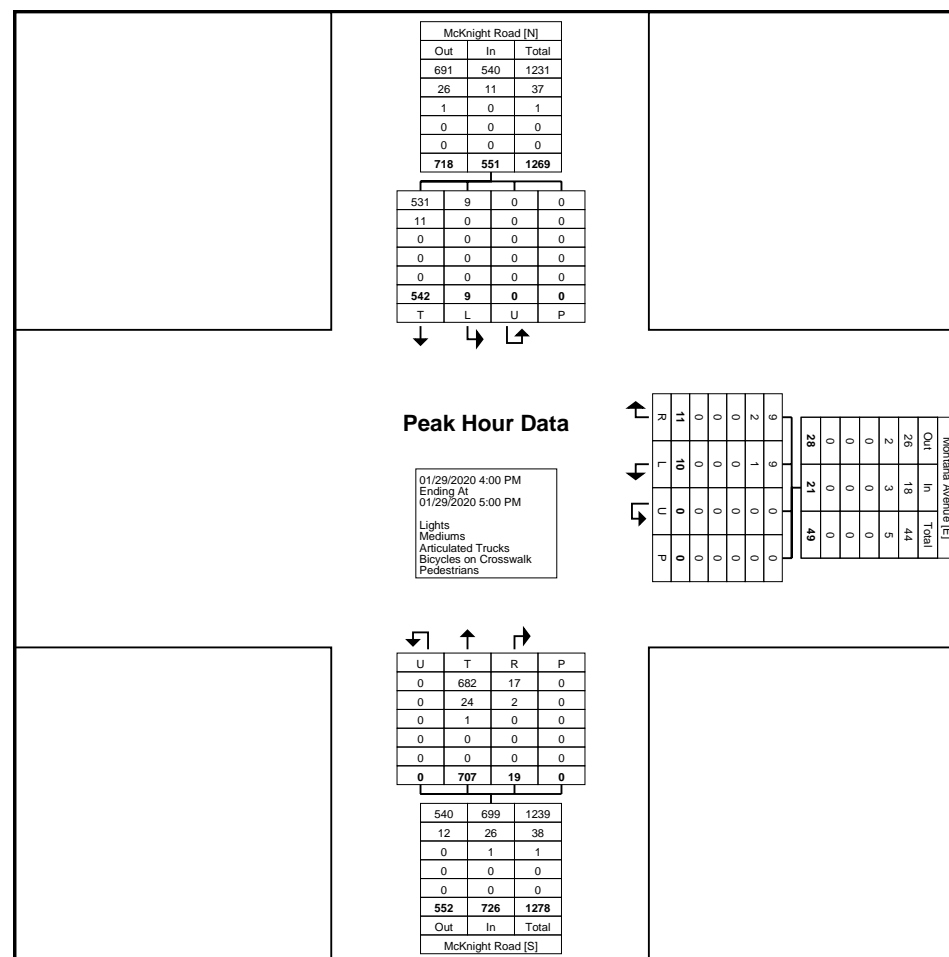
Turning Movement Peak Hour Data Plot (7:15 AM)

Count Name: McKnight Road & Montana Avenue
Site Code:
Start Date: 01/29/2020
Page No: 5

Turning Movement Peak Hour Data (4:00 PM)

[illegible]

Count Name: McKnight Road & Montana
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 6



Turning Movement Peak Hour Data Plot (4:00 PM)

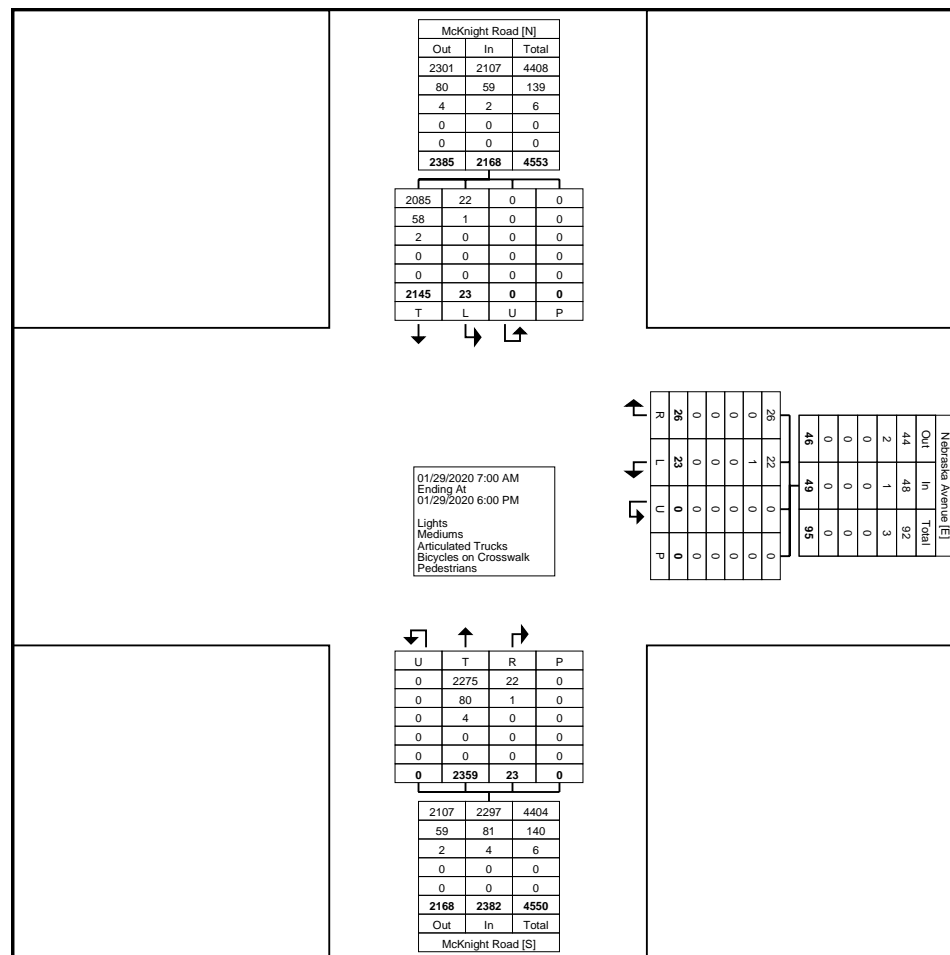
Count Name: McKnight Road & Nebraska Avenue
Site Code:
Start Date: 01/29/2020
Page No: 1

Turning Movement Data

[illegible]

Kimley-Horn : Lisle (IL)
1001 Warrenville Road, Suite 350
Lisle, Illinois, United States 60532
331.481.7332 jack.olsson@kimley-horn.com

Count Name: McKnight Road & Nebraska
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 2



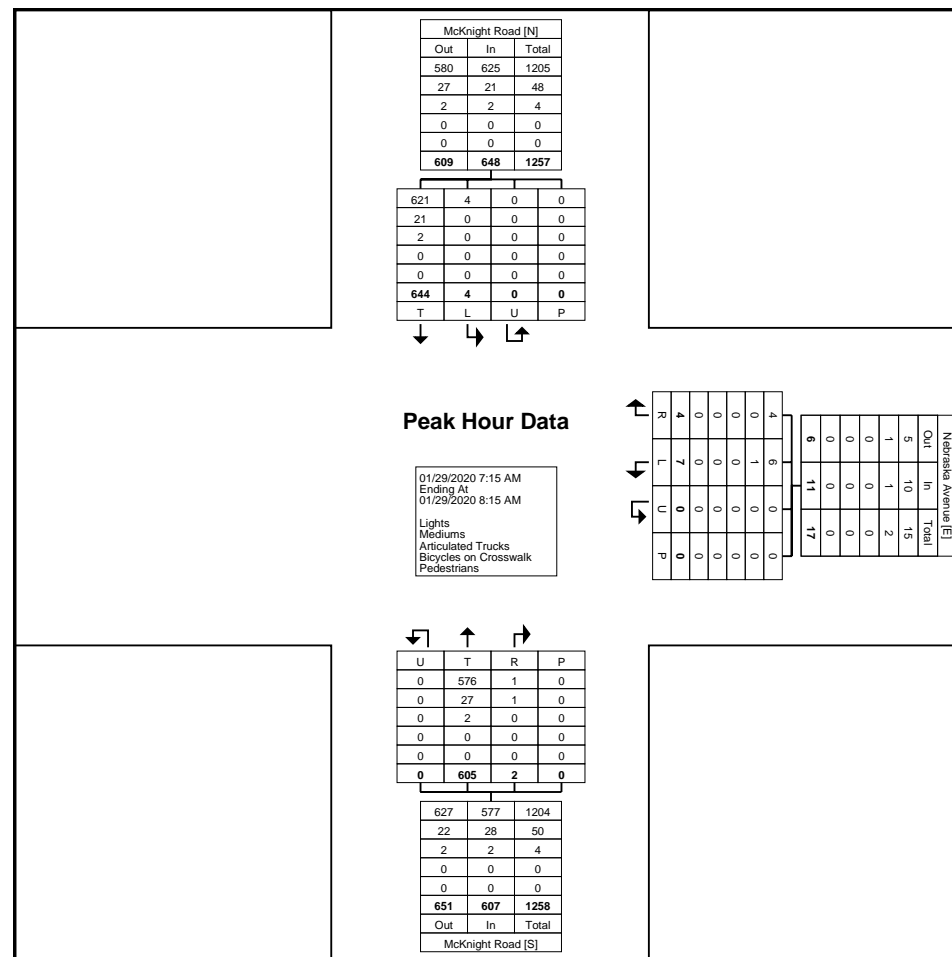
Turning Movement Data Plot

Count Name: McKnight Road & Nebraska Avenue
Site Code:
Start Date: 01/29/2020
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Nebraska Avenue Westbound					McKnight Road Southbound					McKnight Road Northbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
7:15 AM	1	1	0	0	2	0	119	0	0	119	168	0	0	0	168	289
7:30 AM	4	0	0	0	4	2	168	0	0	170	184	0	0	0	184	358
7:45 AM	2	1	0	0	3	0	214	0	0	214	142	2	0	0	144	361
8:00 AM	0	2	0	0	2	2	143	0	0	145	111	0	0	0	111	258
Total	7	4	0	0	11	4	644	0	0	648	605	2	0	0	607	1266
Approach %	63.6	36.4	0.0	-	-	0.6	99.4	0.0	-	-	99.7	0.3	0.0	-	-	-
Total %	0.6	0.3	0.0	-	0.9	0.3	50.9	0.0	-	51.2	47.8	0.2	0.0	-	47.9	-
PHF	0.438	0.500	0.000	-	0.688	0.500	0.752	0.000	-	0.757	0.822	0.250	0.000	-	0.825	0.877
Lights	6	4	0	-	10	4	621	0	-	625	576	1	0	-	577	1212
% Lights	85.7	100.0	-	-	90.9	100.0	96.4	-	-	96.5	95.2	50.0	-	-	95.1	95.7
Mediums	1	0	0	-	1	0	21	0	-	21	27	1	0	-	28	50
% Mediums	14.3	0.0	-	-	9.1	0.0	3.3	-	-	3.2	4.5	50.0	-	-	4.6	3.9
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	2	0	0	-	2	4
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.3	0.0	-	-	0.3	0.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Count Name: McKnight Road & Nebraska Avenue
Site Code:
Start Date: 01/29/2020
Page No: 4



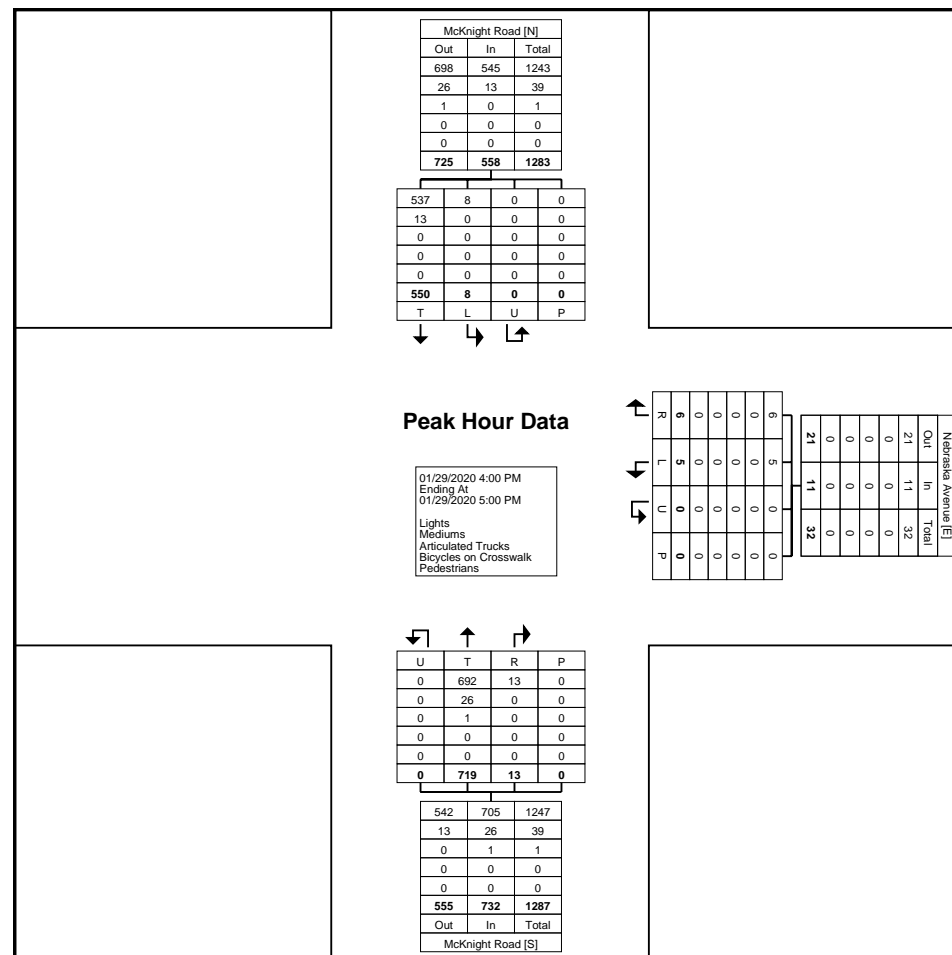
Turning Movement Peak Hour Data Plot (7:15 AM)

Count Name: McKnight Road & Nebraska Avenue
Site Code:
Start Date: 01/29/2020
Page No: 5

Turning Movement Peak Hour Data (4:00 PM)

[illegible]

Count Name: McKnight Road & Nebraska Avenue
Site Code:
Start Date: 01/29/2020
Page No: 6



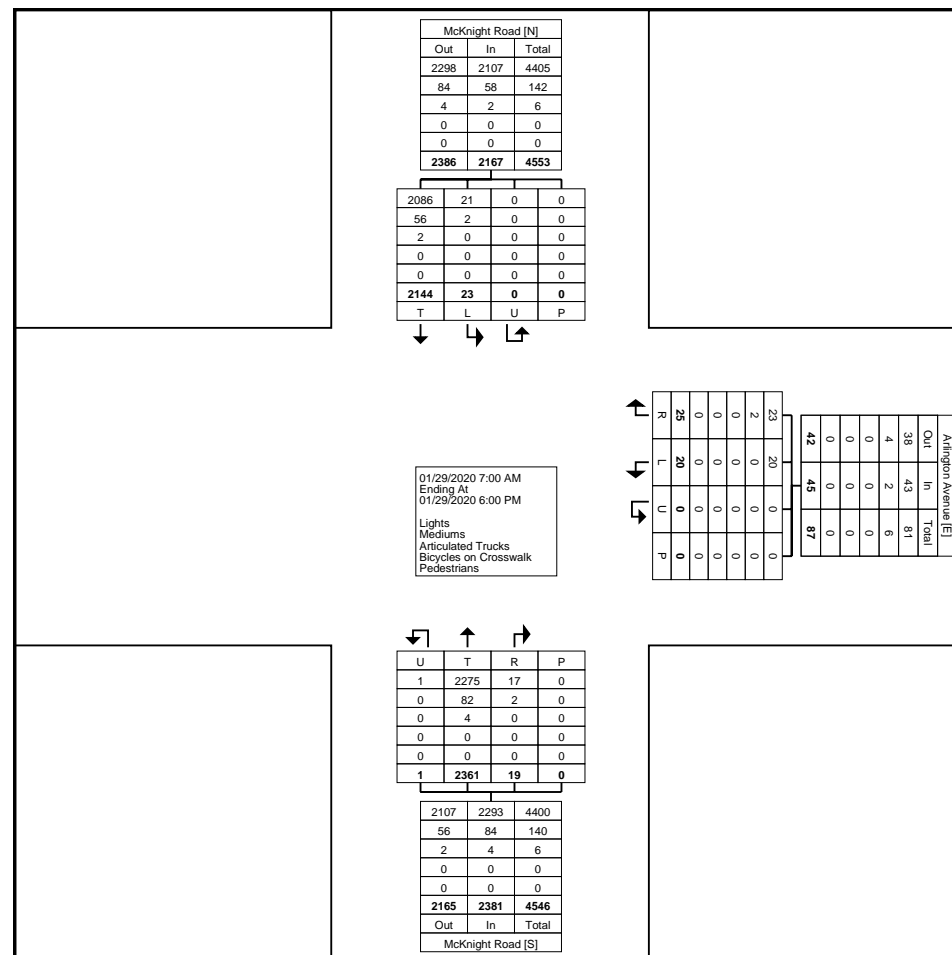
Turning Movement Peak Hour Data Plot (4:00 PM)

Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 1

McKnight Road
Southbound

Start Time	Arlington Avenue Westbound					McKnight Road Southbound					McKnight Road Northbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	1	1	0	0	2	0	86	0	0	86	103	0	0	0	103	191
7:15 AM	2	5	0	0	7	1	121	0	0	122	163	2	0	0	165	294
7:30 AM	2	4	0	0	6	1	166	0	0	167	180	0	0	0	180	353
7:45 AM	1	2	0	0	3	2	221	0	0	223	141	1	0	0	142	368
Hourly Total	6	12	0	0	18	4	594	0	0	598	587	3	0	0	590	1206
8:00 AM	0	1	0	0	1	1	127	0	0	128	110	0	0	0	110	239
8:15 AM	2	0	0	0	2	2	141	0	0	143	100	0	0	0	100	245
8:30 AM	4	2	0	0	6	2	118	0	0	120	105	0	0	0	105	231
8:45 AM	0	1	0	0	1	1	126	0	0	127	99	1	0	0	100	228
Hourly Total	6	4	0	0	10	6	512	0	0	518	414	1	0	0	415	943
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	1	0	0	1	2	141	0	0	143	175	0	0	0	175	319
4:15 PM	0	0	0	0	0	3	143	0	0	146	176	1	1	0	178	324
4:30 PM	0	1	0	0	1	2	139	0	0	141	198	4	0	0	202	344
4:45 PM	2	3	0	0	5	2	120	0	0	122	179	2	0	0	181	308
Hourly Total	2	5	0	0	7	9	543	0	0	552	728	7	1	0	736	1295
5:00 PM	2	1	0	0	3	1	124	0	0	125	181	1	0	0	182	310
5:15 PM	1	1	0	0	2	1	141	0	0	142	181	3	0	0	184	328
5:30 PM	1	2	0	0	3	0	106	0	0	106	153	2	0	0	155	264
5:45 PM	2	0	0	0	2	2	124	0	0	126	117	2	0	0	119	247
Hourly Total	6	4	0	0	10	4	495	0	0	499	632	8	0	0	640	1149
Grand Total	20	25	0	0	45	23	2144	0	0	2167	2361	19	1	0	2381	4593
Approach %	44.4	55.6	0.0	-	-	1.1	98.9	0.0	-	-	99.2	0.8	0.0	-	-	-
Total %	0.4	0.5	0.0	-	1.0	0.5	46.7	0.0	-	47.2	51.4	0.4	0.0	-	51.8	-
Lights	20	23	0	-	43	21	2086	0	-	2107	2275	17	1	-	2293	4443
% Lights	100.0	92.0	-	-	95.6	91.3	97.3	-	-	97.2	96.4	89.5	100.0	-	96.3	96.7
Mediums	0	2	0	-	2	2	56	0	-	58	82	2	0	-	84	144
% Mediums	0.0	8.0	-	-	4.4	8.7	2.6	-	-	2.7	3.5	10.5	0.0	-	3.5	3.1
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	4	0	0	-	4	6
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.1	-	-	0.1	0.2	0.0	0.0	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 2



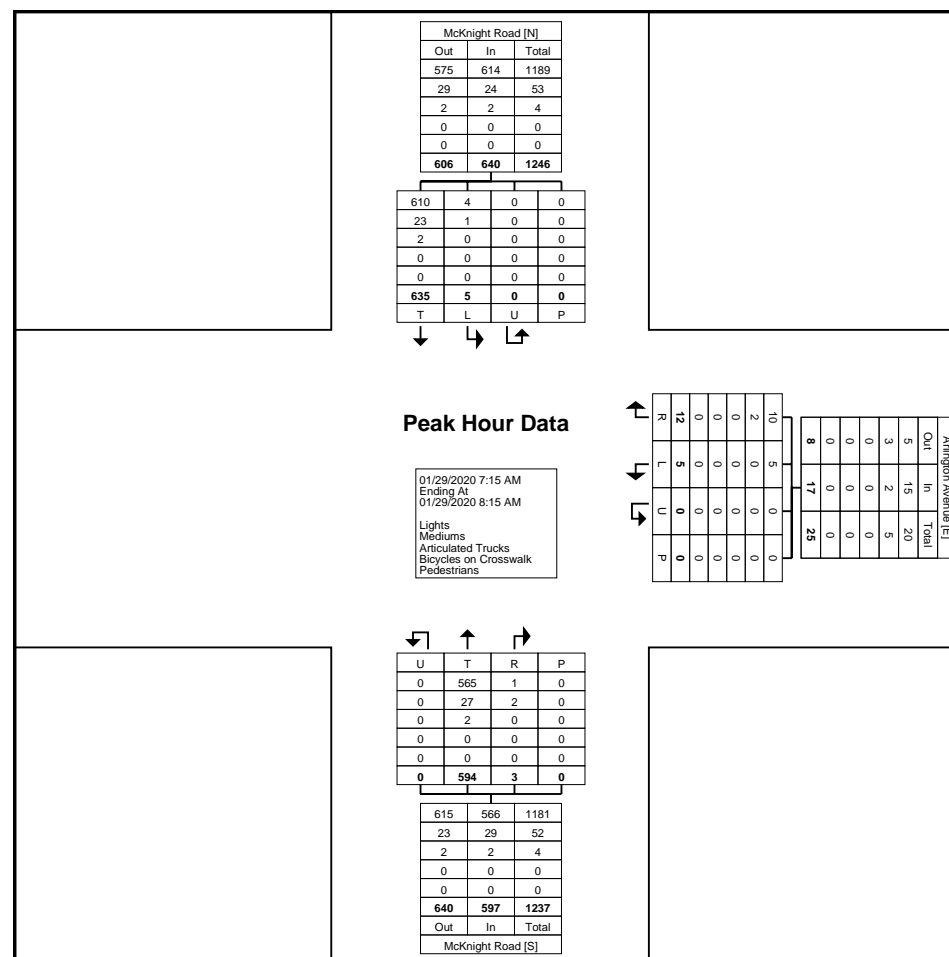
Turning Movement Data Plot

Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

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Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 4



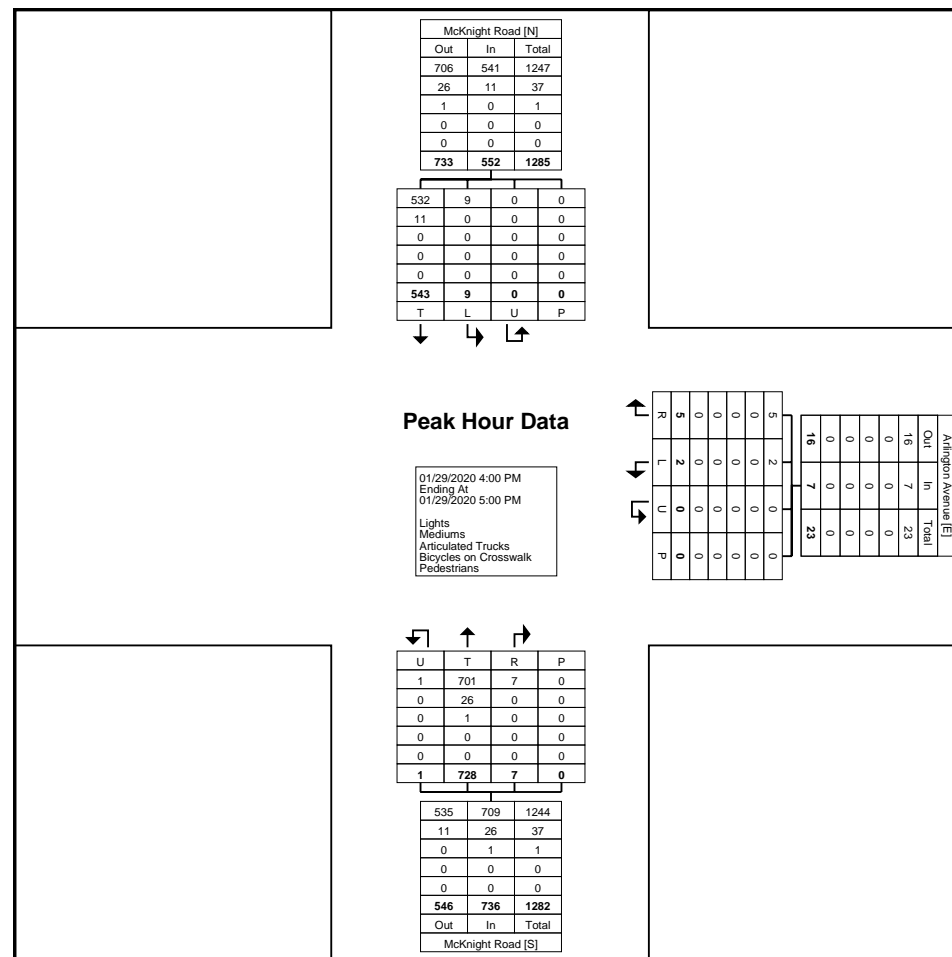
Turning Movement Peak Hour Data Plot (7:15 AM)

Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 5

Turning Movement Peak Hour Data (4:00 PM)

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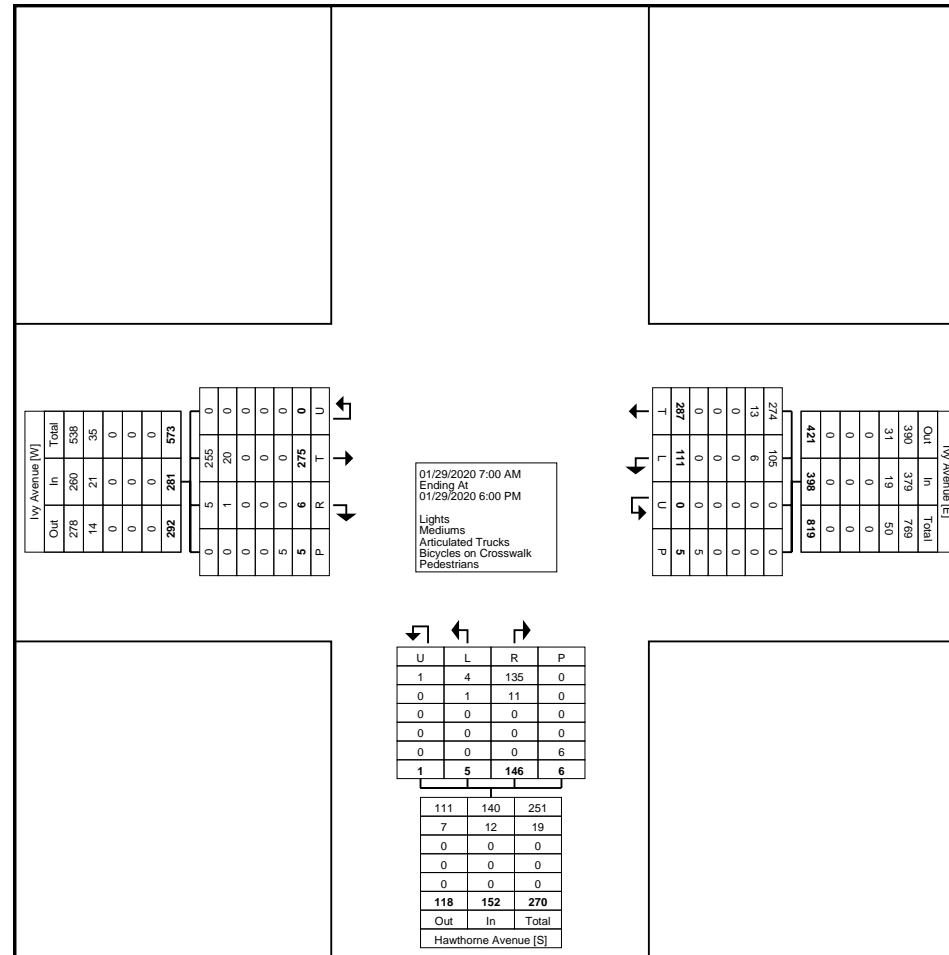
Count Name: McKnight Road & Arlington
Avenue
Site Code:
Start Date: 01/29/2020
Page No: 6



Turning Movement Peak Hour Data Plot (4:00 PM)

Turning Movement Data

Start Time	Ivy Avenue Westbound					Ivy Avenue Eastbound					Hawthorne Avenue Northbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	8	6	0	4	14	8	0	0	1	8	0	6	0	2	6	28
7:15 AM	11	13	0	0	24	16	0	0	0	16	0	6	0	0	6	46
7:30 AM	5	9	0	0	14	18	0	0	0	18	1	7	0	2	8	40
7:45 AM	12	11	0	0	23	26	2	0	0	28	0	7	0	0	7	58
Hourly Total	36	39	0	4	75	68	2	0	1	70	1	26	0	4	27	172
8:00 AM	6	12	0	0	18	12	0	0	0	12	1	4	0	1	5	35
8:15 AM	3	10	0	0	13	15	0	0	0	15	0	7	0	0	7	35
8:30 AM	3	13	0	0	16	11	1	0	0	12	0	5	0	0	5	33
8:45 AM	5	16	0	0	21	15	0	0	0	15	0	4	0	0	4	40
Hourly Total	17	51	0	0	68	53	1	0	0	54	1	20	0	1	21	143
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	11	29	0	0	40	18	1	0	4	19	0	13	0	0	13	72
4:15 PM	8	22	0	0	30	18	2	0	0	20	0	17	0	0	17	67
4:30 PM	6	36	0	0	42	20	0	0	0	20	1	8	0	1	9	71
4:45 PM	8	31	0	0	39	27	0	0	0	27	1	16	0	0	17	83
Hourly Total	33	118	0	0	151	83	3	0	4	86	2	54	0	1	56	293
5:00 PM	4	17	0	0	21	22	0	0	0	22	0	11	0	0	11	54
5:15 PM	8	21	0	0	29	14	0	0	0	14	0	9	0	0	9	52
5:30 PM	8	17	0	0	25	21	0	0	0	21	0	18	0	0	18	64
5:45 PM	5	24	0	1	29	14	0	0	0	14	1	8	1	0	10	53
Hourly Total	25	79	0	1	104	71	0	0	0	71	1	46	1	0	48	223
Grand Total	111	287	0	5	398	275	6	0	5	281	5	146	1	6	152	831
Approach %	27.9	72.1	0.0	-	-	97.9	2.1	0.0	-	-	3.3	96.1	0.7	-	-	-
Total %	13.4	34.5	0.0	-	47.9	33.1	0.7	0.0	-	33.8	0.6	17.6	0.1	-	18.3	-
Lights	105	274	0	-	379	255	5	0	-	260	4	135	1	-	140	779
% Lights	94.6	95.5	-	-	95.2	92.7	83.3	-	-	92.5	80.0	92.5	100.0	-	92.1	93.7
Mediums	6	13	0	-	19	20	1	0	-	21	1	11	0	-	12	52
% Mediums	5.4	4.5	-	-	4.8	7.3	16.7	-	-	7.5	20.0	7.5	0.0	-	7.9	6.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	5	-	-	-	-	5	-	-	-	-	6	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

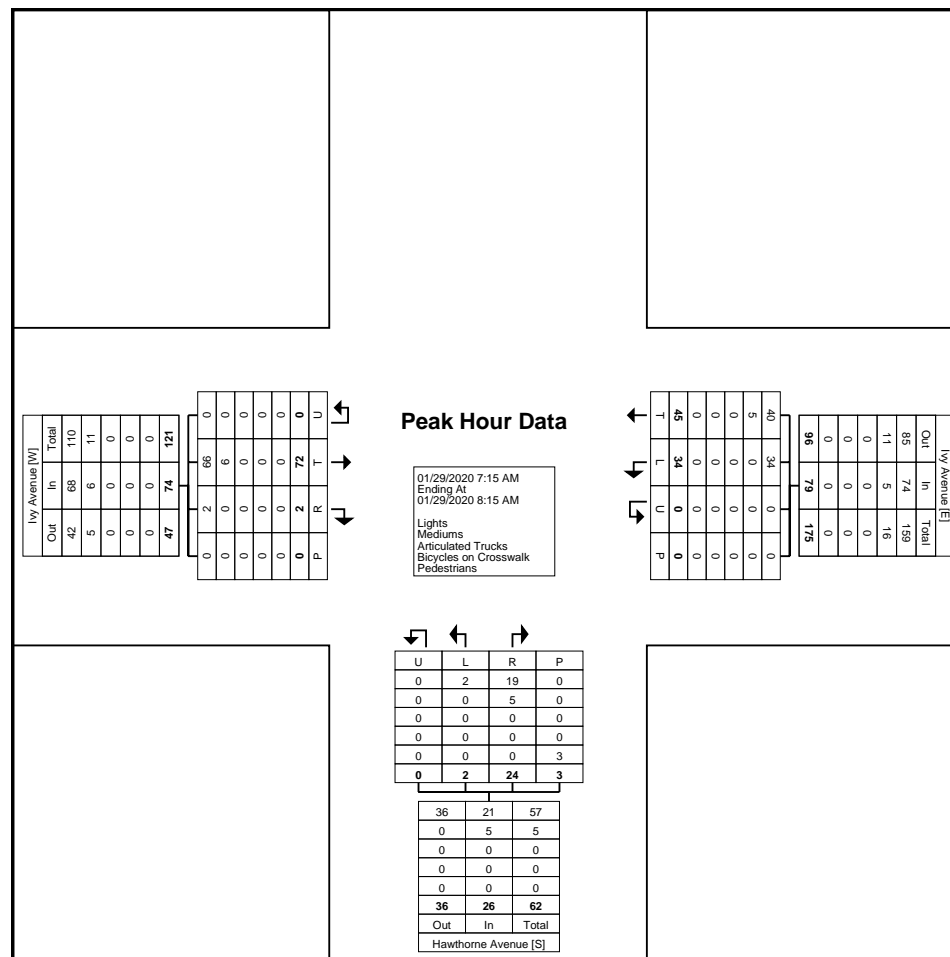


Turning Movement Data Plot

Turning Movement Peak Hour Data (7:15 AM)

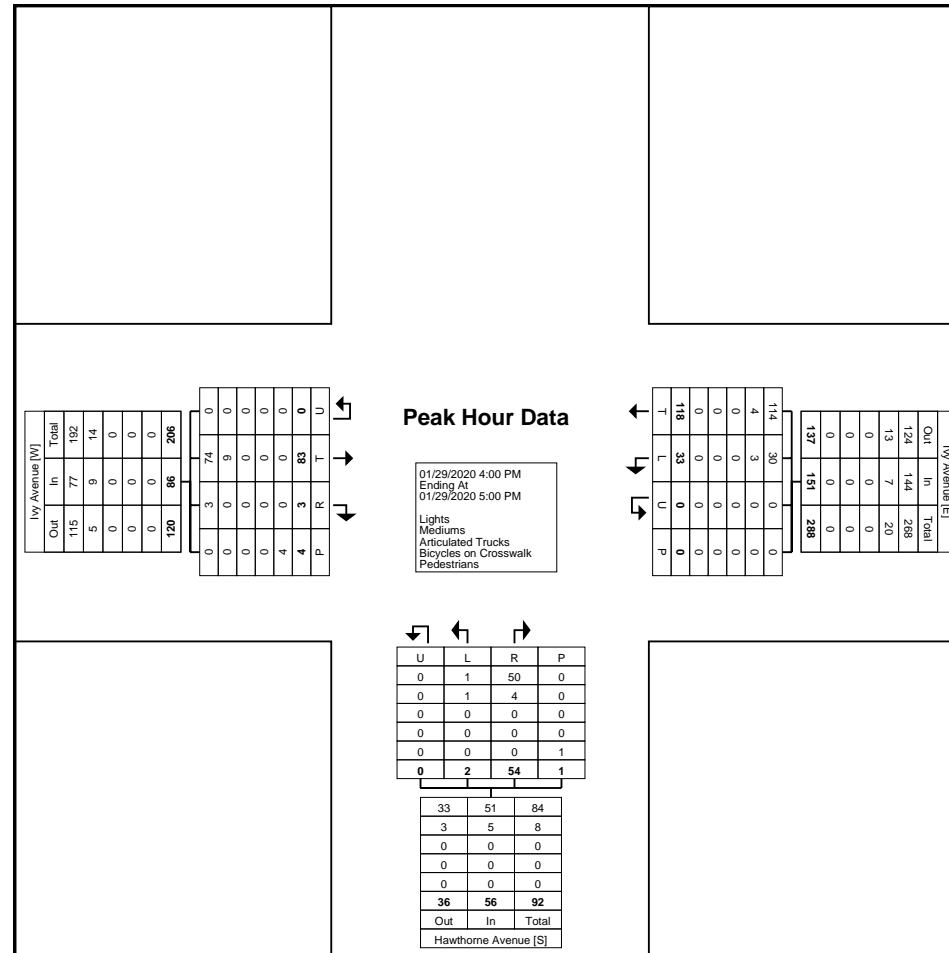
Start Time	Ivy Avenue Westbound					Ivy Avenue Eastbound					Hawthorne Avenue Northbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:15 AM	11	13	0	0	24	16	0	0	0	16	0	6	0	0	6	46
7:30 AM	5	9	0	0	14	18	0	0	0	18	1	7	0	2	8	40
7:45 AM	12	11	0	0	23	26	2	0	0	28	0	7	0	0	7	58
8:00 AM	6	12	0	0	18	12	0	0	0	12	1	4	0	1	5	35
Total	34	45	0	0	79	72	2	0	0	74	2	24	0	3	26	179
Approach %	43.0	57.0	0.0	-	-	97.3	2.7	0.0	-	-	7.7	92.3	0.0	-	-	-
Total %	19.0	25.1	0.0	-	44.1	40.2	1.1	0.0	-	41.3	1.1	13.4	0.0	-	14.5	-
PHF	0.708	0.865	0.000	-	0.823	0.692	0.250	0.000	-	0.661	0.500	0.857	0.000	-	0.813	0.772
Lights	34	40	0	-	74	66	2	0	-	68	2	19	0	-	21	163
% Lights	100.0	88.9	-	-	93.7	91.7	100.0	-	-	91.9	100.0	79.2	-	-	80.8	91.1
Mediums	0	5	0	-	5	6	0	0	-	6	0	5	0	-	5	16
% Mediums	0.0	11.1	-	-	6.3	8.3	0.0	-	-	8.1	0.0	20.8	-	-	19.2	8.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Count Name: Ivy Avenue & Hawthorne Avenue
Site Code:
Start Date: 01/29/2020
Page No: 4



Turning Movement Peak Hour Data (4:00 PM)

Start Time	Ivy Avenue Westbound					Ivy Avenue Eastbound					Hawthorne Avenue Northbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
4:00 PM	11	29	0	0	40	18	1	0	4	19	0	13	0	0	13	72
4:15 PM	8	22	0	0	30	18	2	0	0	20	0	17	0	0	17	67
4:30 PM	6	36	0	0	42	20	0	0	0	20	1	8	0	1	9	71
4:45 PM	8	31	0	0	39	27	0	0	0	27	1	16	0	0	17	83
Total	33	118	0	0	151	83	3	0	4	86	2	54	0	1	56	293
Approach %	21.9	78.1	0.0	-	-	96.5	3.5	0.0	-	-	3.6	96.4	0.0	-	-	-
Total %	11.3	40.3	0.0	-	51.5	28.3	1.0	0.0	-	29.4	0.7	18.4	0.0	-	19.1	-
PHF	0.750	0.819	0.000	-	0.899	0.769	0.375	0.000	-	0.796	0.500	0.794	0.000	-	0.824	0.883
Lights	30	114	0	-	144	74	3	0	-	77	1	50	0	-	51	272
% Lights	90.9	96.6	-	-	95.4	89.2	100.0	-	-	89.5	50.0	92.6	-	-	91.1	92.8
Mediums	3	4	0	-	7	9	0	0	-	9	1	4	0	-	5	21
% Mediums	9.1	3.4	-	-	4.6	10.8	0.0	-	-	10.5	50.0	7.4	-	-	8.9	7.2
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	4	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Turning Movement Peak Hour Data Plot (4:00 PM)

SIMTRAFFIC ANALYSIS RESULTS

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	2.4	0.3	1.6	1.6	7.2	3.9	1.2

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.1	0.6	0.4	0.5	3.0	0.0	0.0	0.0	0.3	0.1	0.2
Total Del/Veh (s)	54.5	45.7	8.1	52.9	47.8	7.8	31.5	32.3	23.4	38.0	34.1	14.6

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	32.3

3: McKnight Rd & Montana Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.2	3.7	0.3	0.0	4.6	3.6	2.2

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.3	2.7	0.3	0.0	2.9	0.5	0.5

5: McKnight Rd & Arlington Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	9.5	2.9	0.2	0.0	3.1	0.7	0.6

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	0.1	0.1	2.1	0.3	4.2	2.7	0.9

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	31.8

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	40	40
Average Queue (ft)	2	15
95th Queue (ft)	19	40
Link Distance (ft)	854	546
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	302	175	285	146	248	244	287	258
Average Queue (ft)	123	69	148	48	153	149	190	143
95th Queue (ft)	238	158	249	118	234	226	275	240
Link Distance (ft)	583		1365		1446	1446	848	848
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		150		225				
Storage Blk Time (%)	5	0	3	0				
Queuing Penalty (veh)	7	0	3	0				

Intersection: 3: McKnight Rd & Montana Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	52	10
Average Queue (ft)	25	0
95th Queue (ft)	47	5
Link Distance (ft)	596	1446
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	35	32
Average Queue (ft)	9	2
95th Queue (ft)	32	16
Link Distance (ft)	575	573
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	30	32
Average Queue (ft)	14	2
95th Queue (ft)	38	14
Link Distance (ft)	553	786
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	30	45
Average Queue (ft)	2	19
95th Queue (ft)	17	44
Link Distance (ft)	442	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 10

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.3	0.0	0.0	0.1	0.1	0.2
Total Del/Veh (s)	4.4	3.8	1.7	1.4	6.7	3.7	2.8

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.4	3.0	0.0	0.0	0.0	0.3	0.1	0.2
Total Del/Veh (s)	77.5	89.5	35.6	57.7	57.0	11.6	34.8	34.9	26.0	35.6	36.9	17.8

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	44.0

3: McKnight Rd & Montana Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.9	3.2	0.5	0.1	7.9	3.8	1.9

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.4	3.5	0.4	0.1	1.9	0.6	0.5

5: McKnight Rd & Arlington Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	12.0	3.0	0.3	0.1	3.2	0.7	0.5

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBT	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.2	0.2	0.1	0.1	0.2
Total Del/Veh (s)	0.2	2.1	0.2	6.7	2.9	0.9

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	42.0

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	170	37
Average Queue (ft)	21	7
95th Queue (ft)	124	28
Link Distance (ft)	854	546
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	562	175	380	182	323	333	273	238
Average Queue (ft)	302	108	157	43	190	194	184	132
95th Queue (ft)	551	227	283	118	279	289	255	228
Link Distance (ft)	583		1365		1446	1446	848	848
Upstream Blk Time (%)	4							
Queuing Penalty (veh)	15							
Storage Bay Dist (ft)		150		225				
Storage Blk Time (%)	43	0	5	0				
Queuing Penalty (veh)	42	0	4	0				

Intersection: 3: McKnight Rd & Montana Ave

Movement	WB	SB	SB
Directions Served	LR	LT	T
Maximum Queue (ft)	31	40	19
Average Queue (ft)	12	4	1
95th Queue (ft)	36	22	12
Link Distance (ft)	596	1446	1446
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	41	33
Average Queue (ft)	11	3
95th Queue (ft)	36	17
Link Distance (ft)	575	573
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	36	27
Average Queue (ft)	7	3
95th Queue (ft)	27	18
Link Distance (ft)	553	786
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	29	54
Average Queue (ft)	2	25
95th Queue (ft)	18	50
Link Distance (ft)	442	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 62

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.5	0.3	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	2.7	0.5	1.7	1.3	8.1	3.7	1.4

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.5	0.5	0.5	2.9	0.0	0.0	0.0	3.3	0.7	0.7
Total Del/Veh (s)	39.5	36.7	14.2	44.2	38.2	10.3	22.4	17.8	13.4	18.3	25.6	19.4

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	23.8

3: McKnight Rd & Montana Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	19.3	6.7	0.8	0.3	4.2	4.0	2.8

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.7	4.2	0.7	0.2	2.6	0.8	0.8

5: McKnight Rd & Arlington Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.5	0.3	0.0	0.0	0.2
Total Del/Veh (s)	19.3	5.0	0.6	0.1	3.1	1.1	1.0

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Total Del/Veh (s)	0.1	0.0	2.1	0.3	4.1	2.7	1.0

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	25.4

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	42	44
Average Queue (ft)	2	17
95th Queue (ft)	21	43
Link Distance (ft)	854	546
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	269	175	286	186	192	303	286	386
Average Queue (ft)	119	71	151	54	66	145	55	205
95th Queue (ft)	211	150	249	119	135	267	177	358
Link Distance (ft)	589		1371			1446		847
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		150		225	300		300	
Storage Blk Time (%)	5	0	3	0		0	0	3
Queuing Penalty (veh)	7	1	3	0		0	0	3

Intersection: 3: McKnight Rd & Montana Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	60	16
Average Queue (ft)	27	1
95th Queue (ft)	55	8
Link Distance (ft)	602	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	31	27
Average Queue (ft)	10	2
95th Queue (ft)	33	15
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	43	28
Average Queue (ft)	13	3
95th Queue (ft)	40	17
Link Distance (ft)	559	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	31	53
Average Queue (ft)	3	21
95th Queue (ft)	17	48
Link Distance (ft)	442	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 15

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.3	0.0	0.0	0.1	0.1	0.2
Total Del/Veh (s)	3.8	0.6	1.8	1.6	10.0	3.9	1.3

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	2.9	0.0	0.0	0.0	3.2	0.8	0.9
Total Del/Veh (s)	48.5	42.6	15.7	41.8	37.5	15.2	26.2	27.9	25.1	25.9	26.9	19.6

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	29.3

3: McKnight Rd & Montana Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.8	7.3	1.3	0.4	6.3	4.0	2.5

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.5	7.2	1.1	0.6	3.2	0.7	1.0

5: McKnight Rd & Arlington Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.7	0.6	0.0	0.0	0.4
Total Del/Veh (s)	18.5	6.3	0.9	0.2	3.6	1.0	1.0

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBT	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.2	0.2	0.2	0.1	0.2
Total Del/Veh (s)	0.1	2.2	0.3	5.0	3.0	0.9

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	29.9

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	52	31
Average Queue (ft)	5	8
95th Queue (ft)	29	30
Link Distance (ft)	854	546
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	402	175	331	219	324	478	216	380
Average Queue (ft)	199	90	148	53	87	238	57	189
95th Queue (ft)	352	197	264	135	219	414	133	326
Link Distance (ft)	589		1371			1446		847
Upstream Blk Time (%)	0							
Queuing Penalty (veh)	1							
Storage Bay Dist (ft)		150		225	300		300	
Storage Blk Time (%)	19	0	3	0		5		1
Queuing Penalty (veh)	21	0	3	0		8		2

Intersection: 3: McKnight Rd & Montana Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	52	28
Average Queue (ft)	16	3
95th Queue (ft)	42	17
Link Distance (ft)	602	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	57	28
Average Queue (ft)	12	3
95th Queue (ft)	39	18
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	34	27
Average Queue (ft)	10	3
95th Queue (ft)	33	17
Link Distance (ft)	559	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	35	53
Average Queue (ft)	3	26
95th Queue (ft)	17	48
Link Distance (ft)	442	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 34

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.0
Total Del/Veh (s)	3.0	1.7	0.9	6.5	2.8	2.4	15.8	9.9	11.2	4.9	4.3

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.6	0.1	0.5	2.9	0.6	3.0	0.0	0.0	0.0	3.1	1.0	0.9
Total Del/Veh (s)	45.0	38.9	25.9	47.7	52.6	36.2	30.5	19.2	12.7	27.1	34.0	28.3

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	32.0

3: McKnight Rd & Montana Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	21.9	10.5	24.0	10.8	4.8	0.9	0.1	5.1	3.0	1.9	2.9

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.5	4.5	0.8	0.2	4.6	1.1	1.1

5: McKnight Rd & Arlington Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.1	3.2	0.7	0.7	0.0	0.0	0.0	0.5
Total Del/Veh (s)	27.0	13.5	25.4	7.1	6.8	1.1	0.2	4.2	2.8	1.1	3.3

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	1.9	0.2	0.1	2.1	0.3	4.5	6.6	2.8	6.7	2.5	1.7

7: McKnight Rd & Site Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	38.9	15.8	9.4	2.1	5.0	2.9	4.8

Total Network Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	32.7

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build AM Peak Hour

02/02/2021

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	33	155	162	45
Average Queue (ft)	2	31	59	16
95th Queue (ft)	14	94	114	41
Link Distance (ft)	553	588	209	540
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	164	306	59	185	454	56	256	342	324	650
Average Queue (ft)	54	144	45	81	237	44	76	178	78	298
95th Queue (ft)	123	261	63	188	429	61	161	290	243	553
Link Distance (ft)		588			1371			415		841
Upstream Blk Time (%)								0		1
Queuing Penalty (veh)								0		0
Storage Bay Dist (ft)	140		25	160		25	300		300	
Storage Blk Time (%)	0	52	24	0	64	17		1		10
Queuing Penalty (veh)	1	104	49	0	117	47		1		9

Intersection: 3: McKnight Rd & Montana Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	70	74	38	6
Average Queue (ft)	25	28	9	0
95th Queue (ft)	55	59	32	4
Link Distance (ft)	421	602		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			200	200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build AM Peak Hour

02/02/2021

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	35	32
Average Queue (ft)	10	2
95th Queue (ft)	33	15
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	200	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (ft)	112	47	85	22	4
Average Queue (ft)	46	16	26	3	0
95th Queue (ft)	85	44	58	16	3
Link Distance (ft)	391	559			781
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200	200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	12	30	31	35
Average Queue (ft)	0	3	23	17
95th Queue (ft)	4	18	44	42
Link Distance (ft)	403	436	422	361
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build AM Peak Hour

02/02/2021

Intersection: 7: McKnight Rd & Site Access

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	99	35	9
Average Queue (ft)	43	14	0
95th Queue (ft)	83	37	5
Link Distance (ft)	275		415
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 328

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.2	0.1	0.1
Total Del/Veh (s)	5.2	1.8	1.0	6.1	2.6	2.2	23.1	15.6	16.9	5.1	6.0

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.0	0.5	3.0	0.0	0.0	0.0	3.2	0.8	0.8
Total Del/Veh (s)	47.9	48.0	33.1	38.2	40.7	29.9	23.5	28.1	22.0	33.9	25.0	17.8

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	31.6

3: McKnight Rd & Montana Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	24.7	9.5	23.6	8.5	3.9	1.4	0.4	6.6	2.4	1.9	2.5

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	19.3	9.0	1.4	0.7	5.8	0.9	1.3

5: McKnight Rd & Arlington Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.1	0.1	2.8	0.8	0.9	0.0	0.0	0.0	0.5
Total Del/Veh (s)	31.6	19.8	15.4	6.1	5.5	1.5	0.7	6.5	2.2	0.8	4.0

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	2.2	0.1	2.1	0.3	4.6	6.8	2.8	6.3	3.2	1.4

8: McKnight Rd & Site Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.5	0.0	0.0	0.0	0.0	0.1
Total Del/Veh (s)	96.3	64.6	9.3	4.3	4.4	2.5	8.5

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	34.6

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build PM Peak Hour

02/02/2021

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	69	110	181	36
Average Queue (ft)	4	23	88	10
95th Queue (ft)	25	75	157	33
Link Distance (ft)	553	589	209	540
Upstream Blk Time (%)			1	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	165	446	58	184	332	60	325	423	234	411
Average Queue (ft)	78	244	41	50	165	40	117	304	63	195
95th Queue (ft)	169	406	62	134	270	64	303	450	145	336
Link Distance (ft)		589			1371			409		841
Upstream Blk Time (%)								1		
Queuing Penalty (veh)								13		
Storage Bay Dist (ft)	140		25	160		25	300		300	
Storage Blk Time (%)	0	64	10	0	60	14		11		1
Queuing Penalty (veh)	0	113	36	0	82	38		15		2

Intersection: 3: McKnight Rd & Montana Ave

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (ft)	78	52	30	33	4
Average Queue (ft)	35	14	8	4	0
95th Queue (ft)	65	41	28	20	3
Link Distance (ft)	421	602			969
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200	200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build PM Peak Hour

02/02/2021

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	48	33
Average Queue (ft)	13	7
95th Queue (ft)	38	26
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	200	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (ft)	178	30	69	27	3
Average Queue (ft)	68	9	21	4	0
95th Queue (ft)	140	31	50	20	0
Link Distance (ft)	391	559			781
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200	200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	31	36	52	41
Average Queue (ft)	2	2	28	19
95th Queue (ft)	13	16	47	45
Link Distance (ft)	405	436	422	522
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
2040 Alternative 1: Hilltop Build PM Peak Hour

02/02/2021

Intersection: 8: McKnight Rd & Site Access

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (ft)	214	55	150
Average Queue (ft)	79	11	15
95th Queue (ft)	191	37	84
Link Distance (ft)	274		969
Upstream Blk Time (%)	2		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)		200	
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Network Summary

Network wide Queuing Penalty: 300

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.0
Total Del/Veh (s)	3.4	1.3	0.7	5.0	2.8	2.2	10.5	4.6	10.3	4.9	2.8

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	2.9	0.6	3.0	0.0	0.0	0.0	3.1	0.9	0.8
Total Del/Veh (s)	44.6	42.5	27.2	54.4	51.9	35.4	30.2	16.8	11.7	24.1	32.2	23.4

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	31.4

3: McKnight Rd & Montana Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	35.8	18.9	31.9	13.6	6.7	1.1	0.2	6.1	4.5	2.6	4.8

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.4	10.2	0.9	0.5	4.8	1.6	1.3

5: McKnight Rd & Arlington Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	3.1	0.8	0.9	0.0	0.0	0.0	0.5
Total Del/Veh (s)	27.0	10.3	22.3	6.2	5.8	1.2	0.5	3.4	2.0	0.6	2.5

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	1.9	0.3	0.4	2.0	0.3	5.0	6.3	2.9	6.3	2.6	1.9

7: Winthrop St & Larpenteur Ave Performance by movement

Movement	EBT	EBR	WBT	NBL	All
Denied Del/Veh (s)	0.3	0.3	0.0	0.1	0.2
Total Del/Veh (s)	1.0	0.6	0.9	10.0	1.3

8: McKnight Rd & Site Access Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.1	0.0
Total Del/Veh (s)	9.5	4.7	3.6	1.7	4.1

Total Network Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	32.7

Queuing and Blocking Report
2040 Alternative 2: Jobs Focused Build AM Peak Hour

02/02/2021

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	52	123	72	44
Average Queue (ft)	4	26	36	17
95th Queue (ft)	25	80	61	44
Link Distance (ft)	602	588	209	540
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	165	390	70	184	451	53	210	227	324	607
Average Queue (ft)	66	157	46	70	235	43	80	160	71	285
95th Queue (ft)	149	307	63	162	424	59	161	251	225	491
Link Distance (ft)		588			1371			212		841
Upstream Blk Time (%)							0	4		
Queuing Penalty (veh)							0	27		
Storage Bay Dist (ft)	140		25	160		25	300		300	
Storage Blk Time (%)	0	54	20	0	65	13	0	4		7
Queuing Penalty (veh)	0	114	42	0	122	36	0	6		7

Intersection: 3: McKnight Rd & Montana Ave

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (ft)	113	74	57	28	24
Average Queue (ft)	45	27	21	2	1
95th Queue (ft)	90	68	49	12	11
Link Distance (ft)	421	602			1167
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200	200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
2040 Alternative 2: Jobs Focused Build AM Peak Hour

02/02/2021

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	40	29
Average Queue (ft)	10	4
95th Queue (ft)	33	19
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	200	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	88	48	71	25
Average Queue (ft)	37	18	28	2
95th Queue (ft)	74	44	57	14
Link Distance (ft)	391	559		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			200	200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	24	33	62	34
Average Queue (ft)	1	2	28	14
95th Queue (ft)	9	13	51	38
Link Distance (ft)	403	436	422	361
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Winthrop St & Larpenteur Ave

Movement	NB
Directions Served	LR
Maximum Queue (ft)	64
Average Queue (ft)	23
95th Queue (ft)	52
Link Distance (ft)	587
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: McKnight Rd & Site Access

Movement	EB	NB
Directions Served	R	T
Maximum Queue (ft)	39	201
Average Queue (ft)	15	34
95th Queue (ft)	40	127
Link Distance (ft)	275	1167
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 354

1: Howard St & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.1	0.1	0.0
Total Del/Veh (s)	4.9	1.9	0.8	5.2	2.6	1.8	12.7	7.9	15.0	3.6	3.4

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.1	0.5	2.9	0.0	0.0	0.0	3.2	0.8	0.8
Total Del/Veh (s)	56.3	50.5	40.9	41.8	43.2	28.7	23.9	25.1	17.3	37.1	25.8	18.9

2: McKnight Rd & Larpenteur Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	32.6

3: McKnight Rd & Montana Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	53.2	37.2	21.8	10.0	5.6	1.9	0.6	8.7	3.2	1.7	6.0

4: McKnight Rd & Nebraska Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	18.7	5.4	1.3	0.7	5.0	1.2	1.3

5: McKnight Rd & Arlington Ave Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.1	0.2	2.9	0.8	0.6	0.0	0.0	0.0	0.5
Total Del/Veh (s)	25.1	11.0	26.3	9.2	4.0	1.3	0.3	6.3	1.9	0.5	2.7

6: Hawthorne Ave & Ivy Ave Performance by movement

Movement	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	2.1	0.2	2.1	0.3	5.0	6.8	3.1	6.7	3.4	1.7

7: Winthrop Ave & Larpenteur Ave Performance by movement

Movement	EBT	EBR	WBT	NBL	All
Denied Del/Veh (s)	0.4	0.3	0.0	0.1	0.2
Total Del/Veh (s)	0.7	0.3	1.0	11.8	1.4

8: McKnight Rd & Site Access Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.6	22.9	3.1	1.4	14.5

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	39.2

Queuing and Blocking Report
2040 Alternative 2: Jobs Focused Build PM Peak Hour

02/02/2021

Intersection: 1: Howard St & Larpenteur Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	127	106	140	31
Average Queue (ft)	9	18	52	8
95th Queue (ft)	72	64	97	30
Link Distance (ft)	602	588	209	540
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: McKnight Rd & Larpenteur Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	165	527	59	184	380	60	217	238	302	377
Average Queue (ft)	96	270	40	52	184	41	79	216	76	203
95th Queue (ft)	185	460	62	134	315	63	175	257	187	342
Link Distance (ft)		588			1371			218		841
Upstream Blk Time (%)		1					0	20		
Queuing Penalty (veh)		4					0	170		
Storage Bay Dist (ft)	140		25	160		25	300		300	
Storage Blk Time (%)	1	64	8		61	15	0	20		2
Queuing Penalty (veh)	3	134	30		82	38	0	28		2

Intersection: 3: McKnight Rd & Montana Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	210	48	44	10	34	4
Average Queue (ft)	83	15	13	0	4	0
95th Queue (ft)	178	42	37	0	21	3
Link Distance (ft)	421	602		579		1161
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			200		200	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
2040 Alternative 2: Jobs Focused Build PM Peak Hour

02/02/2021

Intersection: 4: McKnight Rd & Nebraska Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	40	29
Average Queue (ft)	13	6
95th Queue (ft)	38	25
Link Distance (ft)	581	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	200	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: McKnight Rd & Arlington Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	122	38	49	35
Average Queue (ft)	50	11	17	5
95th Queue (ft)	91	35	40	23
Link Distance (ft)	391	559		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		200	200	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Hawthorne Ave & Ivy Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	31	35	54	40
Average Queue (ft)	2	3	29	20
95th Queue (ft)	15	18	47	45
Link Distance (ft)	405	436	422	522
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Winthrop Ave & Larpenteur Ave

Movement	NB
Directions Served	LR
Maximum Queue (ft)	67
Average Queue (ft)	30
95th Queue (ft)	59
Link Distance (ft)	453
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: McKnight Rd & Site Access

Movement	EB	NB
Directions Served	R	T
Maximum Queue (ft)	57	367
Average Queue (ft)	18	141
95th Queue (ft)	48	294
Link Distance (ft)	275	1161
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 491
